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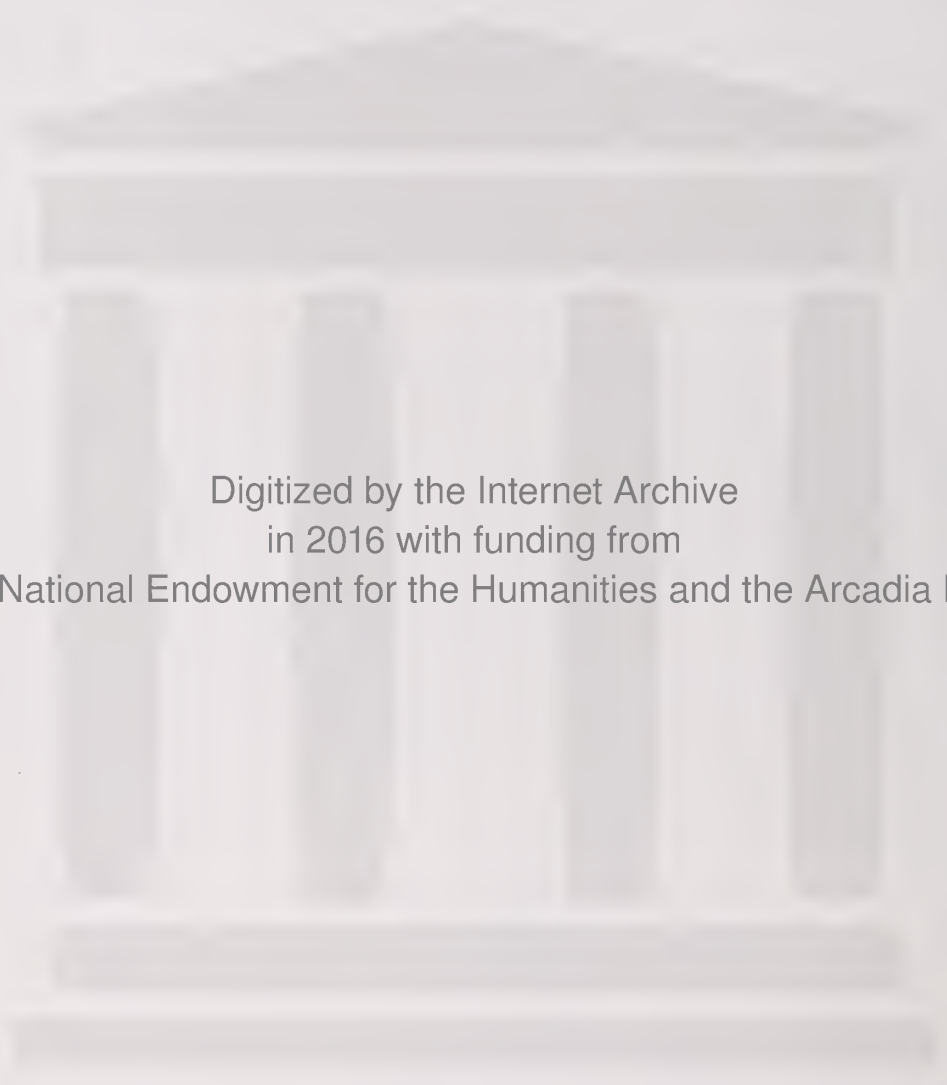


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JANUARY, 1973



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Until response is determined, patients receiving Valium should be cautioned against engaging in hazardous occupations requiring complete mental alertness, such as driving or operating machinery.

Before prescribing, please consult complete product information, a summary of which follows:

Indications: Tension and anxiety states; somatic complaints which are concomitants of emotional factors; psychoneurotic states manifested by tension, anxiety, apprehension, fatigue, depressive symptoms or agitation; symptomatic relief of acute agitation, tremor, delirium tremens and hallucinosis due to acute alcohol withdrawal; adjunctively in skeletal muscle spasm due to reflex spasm to local pathology, spasticity caused by upper motor neuron disorders, athetosis, stiff-man syndrome, convulsive disorders (not for sole therapy).

Contraindicated: Known hypersensitivity to the drug. Children under 6 months of age. Acute narrow angle glaucoma; may be used in patients with open angle glaucoma who are receiving appropriate therapy.

Warnings: Not of value in psychotic patients. Caution against hazardous occupations requiring complete mental alertness. When used adjunctively in convulsive disorders, possibility of increase in frequency and/or severity of grand mal seizures may require increased dosage of standard anticonvulsant medication; abrupt withdrawal may be associated with temporary increase in frequency and/or severity of seizures. Advise against simultaneous ingestion of alcohol and other CNS depressants. Withdrawal symptoms (similar to those with barbiturates and alcohol) have occurred following abrupt discontinuance (convulsions, tremor, abdominal and muscle cramps, vomiting and sweating). Keep addiction-prone individuals under careful surveillance because of their predisposition to habituation and dependence. In pregnancy, lactation or women of childbearing age, weigh potential benefit against possible hazard.

Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

Dosage: Individualize for maximum beneficial effect.

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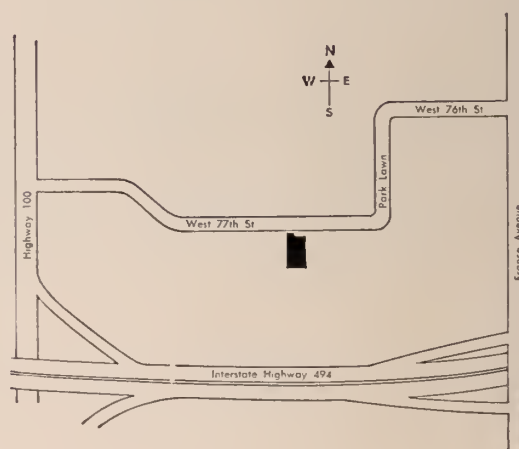
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Contraindications: Children 14 years or less, senile patients, history or symptoms of G.I. inflammation or ulceration including severe recurrent or persistent dyspepsia, history or presence of drug allergy, blood dyscrasias, renal, hepatic or cardiac dysfunction, hypertension, thyroid disease, systemic edema, stomatitis and salivary gland enlargement due to the drug, polymyalgia rheumatica and temporal arteritis, patients receiving other potent chemotherapeutic agents, or long term anticoagulant therapy.

Warnings: Age, weight, dosage, duration of therapy, existence of concomitant diseases, and concurrent potent chemotherapy affect incidence of toxic reactions. Carefully instruct and observe the individual patient, especially the aging (forty years and over) who have increased susceptibility to the toxicity of the drug. Use the most effective dosage. Weigh initially unpredictable benefits against potential risk of severe, even fatal, reactions. The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias

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including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonylurea, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom. Worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

Precautions: The following should be accomplished at regular intervals. Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activity requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

Adverse Reactions: This is a potent drug, its misuse can lead to serious results. Review detailed information before beginning therapy. Ulcerative esophagitis, acute and reactivated gastric and duodenal ulcer with perforation and hemorrhage, ulceration and perforation of large bowel, occult G.I. bleeding with anemia, gastritis,

epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, aplastic anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fatal and nonfatal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomata, aggravation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with overdosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement (B)98-146-070-G

Serious side effects do occur. Select patients carefully (particularly the elderly) and follow them closely in line with the drug's precautions, warnings, contraindications and adverse reactions

For complete details, including dosage, please see full prescribing information.

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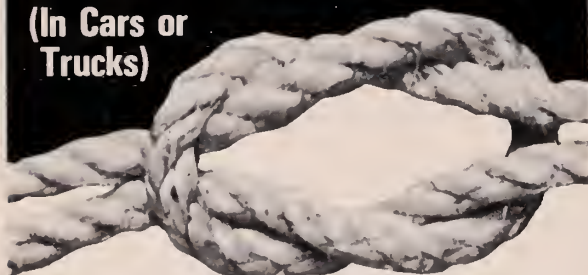
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President's Letter



A Beginning

One second ticks by and another year begins. The public media "wrap up" the old year for us, as if to bury it, then look to the future with hope. The newness is the promise of the future, and by habit we expect it to be more rewarding. Thus we celebrate the new year.

It seems apparent that our parade of passing years should teach us that we live *now*, not in the past or the future. What we do, what we feel, what we hope for or regret exists in the present. Right now we can use the past and plan for the future, or we can be trapped into regretting the past and dreaming of better things to come. Each of us has that vitalness we call life and each of us must decide how we live it.

Our family is presently grieving over the death of Cheryl, whose life illustrated that we live day by day. At eighteen she was a vital force whose sensitiveness to others caused her great inner turmoil but whose fortitude never allowed her to cease the struggle to find her place in our world. We never fully realized the number of lives that she touched, the help she offered others. Can a better tribute be paid to any human than that he used what he was given to the best he was able? That is my wish for the new year.

To each of you, a beginning. The full use of your talents; each day a vitalness that is life itself; and while it may or may not be happy, a year to remember with warmth for it indeed was LIVED!

George B. Martin

President
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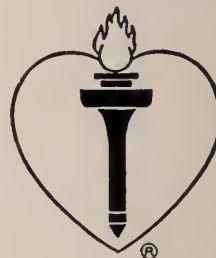
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— George Sarton, from "The History of Medicine Versus the History of Art"

**Are combination drug
products useful in treatment
involving concomitant use
of two or more drugs?**

Opinion

**Results of a questionnaire to
7,000 physicians:**

62.9%

**Believe combination drug
products are useful.**

13.8%

**Do not believe combination drug
products are useful.**

Are combination drug products useful in treatment involving concomitant use of two or more drugs?

Opinion & Dialogue

Doctor of Medicine

Louis Lasagna, M.D.
Professor and Chairman
Department of
Pharmacology & Toxicology
University of Rochester
School of Medicine
and Dentistry



Obviously, many drugs are given concomitantly. Whether it makes sense to combine medications in one preparation, be it capsule, tablet, or liquid, is a question that can be answered only by examining the advantages and disadvantages in the individual case.

Among the advantages is, first of all, convenience. The more medications that are taken concurrently and the more complicated the directions, the less likely the patient is to take medications accurately. From the standpoint of convenience and accuracy, and economy as well, you can make an important case for putting medications together in one preparation, as long as they are compatible.

By the same token, when you prescribe a properly tested and rational combination, you should have less worry about pharmaceutical or pharmacological compatibility—and about reasonable dosage ratios as well. Compatibility of the formulation should be demonstrated in the laboratory and clinic before the product is available for prescription—which is more than can usually be said for

the physician's own spontaneous creations. And, the dosage ratios employed in rational precompounded combinations are designed to meet the needs of substantial numbers of "typical" patients.

There is no doubt that many "atypical" patients are to be found, and for them the prefabricated combination must be rejected. But that hardly argues for eliminating rational combinations from the market. Think, for example, of the problems that would arise if the components of widely accepted combinations, like the oral contraceptives and the diuretic-antihypertensives, always had to be prescribed, purchased and ingested separately.

One disadvantage that comes to mind is some doctors' unawareness of the ingredients a given combination contains. For example, a doctor might know that a patient is allergic to aspirin but forget that a certain analgesic mixture, which he knows only by its trade name, contains aspirin. His prescription, then, causes considerable discomfort, to say the least. This problem is a function of physician education, rather than of combination therapy as such. Improving doctors' knowledge about all medicaments they prescribe is a problem that deserves tackling on its own.

Another accusation leveled at combination drugs is that they encourage sloppiness of diagnosis and treatment. In many cases, however, a combination may prove to be the most effective choice. A good ex-

ample of the usefulness of combinations appears in a recent article in the *Journal of Chronic Diseases* on the efficacy and side effects of an antihypertensive containing three ingredients, in which the track records of the combination drug and the individual ingredients were compared. Interestingly enough, whether the drugs were given individually or together, incidence and severity of side effects were the same. But blood pressure control was invariably better when the drugs were taken in one combination tablet than when they were taken separately (in "titratable" dosage) or in two or three different tablets.

Deciding which combinations constitute rational therapy obviously leads to a discussion of who is to determine which should be used and which should not. Realistically, I think combinations should be evaluated somewhat differently if they are old and established or new and untried.

In today's regulatory atmosphere, there is no possibility of a new combination being put on the market without a substantial amount of acceptable evidence in the form of controlled trials that show it to be safe and efficacious. On the other hand, I believe a different set of standards should apply to combination preparations that have been around for a long time. In other words, physician acceptance over a long period should be given some weight as evidence of the efficacy and safety of these drugs.

The FDA, however, does not seem to share this attitude. It often requires, for these older products, controlled trials that will monopolize the time of already overtired investiga-

tors and cost a great deal of money. I wish we could agree on a "grandfather clause" approach to preparations that have been in for a number of years that have an apparently satisfactory track record.

For example, I think some of the antibiotic combinations that were taken off the market by the FDA performed quite well. I'm thinking particularly of penicillin-streptomycin combinations that patients—especially surgical patients—were given in injection. This made less discomfort for the patient, less demand on nurses' time, and fewer opportunities for dosing errors. To take such preparation off the market doesn't seem to be good medicine, unless actual age showed a great deal of harm from the injection (rather than the pro use) of the combination.

The point that should be emphasized is that there are both rational and irrational combinations. The real question is, who should determine which is which? Obviously, the FDA may play a major role in making this determination. In fact, I don't think it could avoid taking the ultimate responsibility, but it should enlist the help of outside physicians and experts in assessing the evidence and in making the ultimate decision.

Maker of Medicine

V. Clarke Wescoe, M.D.
President
Winthrop Laboratories



If two medications are used effectively to treat a certain condition, and it is known that they are compatible, it clearly is useful and convenient to provide them in one dosage form. It would make no sense, in fact, it would be pedantic, to insist they always be prescribed separately. To avoid the appearance of pedantry, the "expert" decries the combination because it is a fixed dosage form. When the "expert" evokes the concept of fixed dosage form he obscures the fact that single-ingredient pharmaceutical preparations are also fixed dosage forms. By a singular semantic exercise he imparts a pejorative meaning to the term "fixed dose" only when he uses it with respect to combinations. What is ignored is the simple fact that only in the best of circumstances does any physician attempt to titrate an exact therapeutic response in his patient. It is quite possible that some aches and pains will respond to 500 mg. of aspirin yet that fact does not militate against the usefulness of a 650 mg. dose. The other semantic ploy often called into play is to prescribe a combination product as rational or irrational. Take antibiotic mixtures, a source of much of the criticism generated against

combinations generally. Obviously, no one should be exposed willy-nilly to the potential side effects of two or three antibiotics when only one is needed. At the same time there are cases where it is prudent to prescribe more than one. The clinician is the judge in these circumstances, as he should be.

There is no clear definition of the word rational. Most persons, I suppose, would find it synonymous with reasonable, but in many circumstances it may best be defined as the opinion of those in power at the moment.

Other factors govern combination therapy, not the least of which has been its broad use by practicing physicians anxious to achieve convenience in prescribing, to reduce medication error, and to save money for their patients. Combinations clearly have met the test on all three counts.

I have been impressed by studies showing that the rate of error climbs markedly with the number of medications to be taken, even with sophisticated patients. When medically justified, therefore, this factor alone supports the logic of combination therapy.

The cost argument for combinations appears to be irrefutable. In 1971, R. A. Gosselin studied the 71 combination products (excluding oral contraceptives) among the 200 most prescribed drugs. The study found that if all 71 products were discontinued, and if each ingredient in these combinations were prescribed separately, the price of medicines to patients would jump by \$443.2 million on a national basis! At a time when the cost of medical care is under so much fire, it would be nonsensical to boost costs without clearly irre-

futable medical reasons.

The part played by government on this question, of course, is fundamental. The FDA should play a role in determining which combinations are reasonable. That role, as defined by law and regulation, is to ensure that any medication on the market is safe and effective in line with its label claims. Certainly combinations are entitled to as much consideration as single entities—neither more nor less. So long as the addition of one drug to another does not make either less safe, or less effective, so long as they are compatible in a formulation, we have a reasonable product. It makes no sense to recommend the use of two products for certain conditions and to deny their being combined in a single form. An unhappy side effect of the problem concerns the efficacy panel discussions of many products submitted for review. The term "effective, but" has been freely interpreted to mean "ineffective" in toto, regardless of the merit of the individual drugs. This interpretation has placed numerous useful combination products in needless jeopardy.

In reading the actual reports of the review panels, it seems clear that some of the ratings were based less on scientific research and clinical observation than on the "informed" opinions of the panelists. These "informed" opinions were accepted at face value, while

the "informed" opinions of others who had used the products were rejected. All of this put combination products into a sort of scientific never-never land.

It should be kept in mind by all, government as well as others involved in our health care system, that advances in therapy are seldom made in leaps and bounds but rather by small painstaking steps—and that some of these steps have resulted from research in combination drugs as well as with single entities. Given the near-infinite biologic variation in patient response, this is hardly surprising to clinicians. It should not be to regulatory agencies either.

In the end, the practicing physician is in the best position to decide if a particular combination makes sense. Such a decision should not be made exclusively by those whose responsibility for continuing clinical care is limited. Clinicians are the best judges of efficacy because the ultimate proof of any product's effectiveness is acceptance by physicians who have observed its actions in patients over time. The corollary statement may be made about over-the-counter medicines, which would not long survive if they failed to afford the relief the user anticipates. That the antihistamine in a "cold" remedy may not *always* be necessary is no reason to proscrib the combination generally.

Opinion & Dialogue

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Infectious Hepatitis after Ingestion of Raw Clams

LUKAS GUIDON, M.D. AND CLAUS A. PIERACH, M.D.

INFECTIONOUS HEPATITIS is most frequently transmitted by person-to-person contact. It is well known that contaminated water, milk, and food can be the vehicle for the infective agent. In the last six years, several epidemics of infectious hepatitis have been traced to clams and oysters, harvested from contaminated waters, and then ingested raw or steamed.

Although raw shellfish is not on the daily menu in the Mid-West, we have to consider this route of transmission because of the increasing tourism and interest in international food and increased pollution of the seawater.

It is the purpose of the following case report to remind physicians and gourmets that ingestion of raw shellfish may be harmful.

Case Report

A 70-year-old white man came to the outpatient clinic of Northwestern Hospital on April 19, 1972 complaining of general malaise and intermittent febrile episodes with shaking chills for the last few days.

His past medical history was essentially unrevealing. He never had blood transfusions, nor had he had jaundice or contact with jaundiced persons, and he had noted no color change in his urine or stool.

In the beginning of March, 1972, he was in Florida, where on one occasion he ate a few raw clams. Since February, 1972, he had been taking Parnate® 10 mg tid, and Stelazine® 2 mg bid, for depression.

Physical examination on admission showed the patient to be well oriented, well nourished, and in no acute distress. Pulse was 80/min regular, blood pressure 110/75 mm Hg, respirations 18/min, temperature 37.2°C. There was mild jaundice of the sclerae, and a slightly tender liver edge, only palpable on deep inspiration.

The most important laboratory results on admission, during hospitalization, and after discharge are shown in the Figure.

Hemoglobin remained between 11.9 gm% and 14.5 gm%, white blood cell count between 3200 and 5000 cells/mm.³ Serum NH₃ varied between 91 and 119 mcg%, serum iron between 107 and 180 mcg%, and iron-binding

capacity between 220 and 472 mcg%. Serum calcium, phosphate, glucose, uric acid, proteins, and electrolytes stayed within normal limits. Australia antigen and antibody was negative (isoprecipitin technique). The blood could not be tested for epidemic hepatitis associated antigen—Milan (EHAA). Urine was initially positive for bilirubin, and 24-hour urines contained between 0.5 mg and 4.6 mg urobilinogen. Urobilinogen in a random stool sample was 62.4 mg/100 gm on 4/26/72. Stool examinations showed occult blood up to 4+, but mostly 1+ or negative. Electrocardiographic tracings showed left axis deviation with signs of a possible old inferior infarct.

Infectious hepatitis was diagnosed and the patient was treated with bedrest, intravenous infusions of 10% Levulose in water with Vitamin B₁ 10 mg, Vitamin B₂ 10 mg, Niacinamide 250 mg, Pyridoxine 5 mg, and ascorbic acid 500 mg per liter given 75 cc/hour. Parnate® and Stelazine® were discontinued. Although the patient developed a deep jaundice in the first week, he improved from his severe hepatitis with remarkable rapidity. His appetite picked up after three days, and he was discharged after 17 days, in good condition.

We had considered in our patient the possibility of a reaction to Parnate® and/or Stelazine®. The reported cases with jaundice in connection with these drugs had either typical signs of cholestasis with only mild evidence of liver damage, two to four weeks after the drugs were started, or signs of hypersensitivity, such as fever, eosinophilia, skin eruptions, and hepatosplenomegaly. In our case, a chemical induced jaundice is unlikely, since neither of these reactions were present.

Discussion

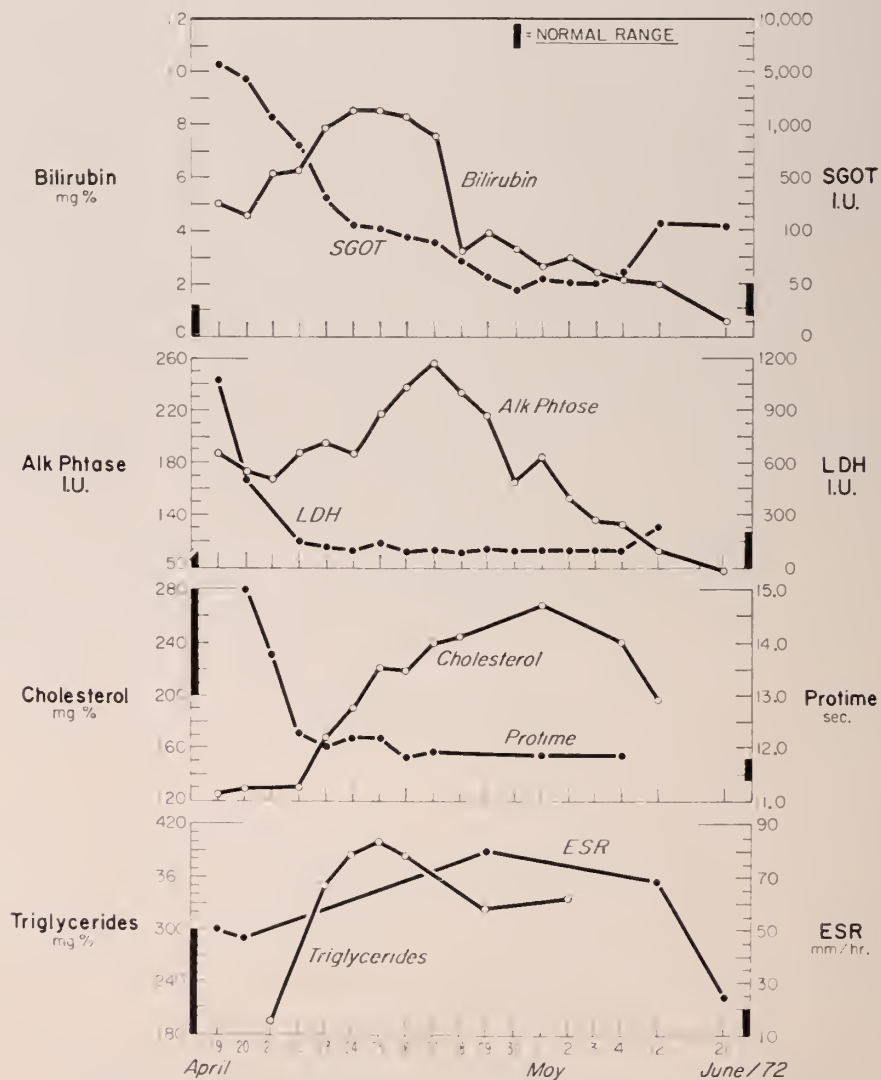
Epidemic jaundice has been recognized for many centuries. Person-to-person contact is the most frequent route of transmission of infectious hepatitis (Virus A). However, since the nineteenth century there have been epidemics of jaundice that have been attributed to water-borne transmission. Mosley, in 1959, reviewed the literature about water-borne epidemics of infectious hepatitis.¹ Between 1895 and 1957, he found 33 reports of 28 epidemics attributed to drinking of contaminated

From the University of Minnesota Unit for Teaching and Research in Internal Medicine at Abbott-Northwestern Hospital, Minneapolis, Minnesota.

water. Besides water-borne epidemics, there are several food-transmitted epidemics of infectious hepatitis reported.²⁻¹³ In three epidemics, unpasteurized milk was the presumed vehicle.^{2,3,8} In five other epidemics it was custard,⁶ sandwiches with raw meat, cheese and garnishes,⁹ mayonnaise in potato salad,¹¹ orange juice,¹² roast pork, and green salad.¹³

Infectious hepatitis (Virus A) can also be transmitted by parenteral route^{16,17} (Table 1). Shellfish, living in contaminated water, are likely to harbor the virus. In 1956, the first epidemic of hepatitis attributed to the ingestion of raw shellfish was recognized in Sweden.¹⁸ For some of the patients who had eaten oysters on only one occasion, it

was possible to determine the exact date of consumption, as well as the date of onset. The length of the incubation period varied from 18 to 44 days, with an average length of 29 days. There was no significant difference in the length of the incubation period between those who had eaten only one or two oysters and those who had eaten more than six. It could be concluded that the consumption of one single oyster was sufficient to produce hepatitis with clinical symptoms. The majority of the cases belonged to the highest social groups, and more than 50% were adult males. This episode attracted wide attention, but little apprehension that shellfish-associated hepatitis might occur in the United States. In 1961, however, two shellfish-associated epidemics were rec-



Figure—Graphic presentation of the laboratory data in our patient with hepatitis.

ognized in this country. The first was traced to raw oysters, and accounted for 80 cases in Mississippi and Alabama, and four additional cases in three other states.¹⁹ The second, related to the ingestion of raw clams, consisted of 459 cases in New Jersey, and an undetermined number in other states.¹⁰ Early in 1963, an unusual proportion of hepatitis patients at each of two hospitals, one in Connecticut and the other in New Jersey, reported having eaten raw clams. Local, state, and federal agencies began epidemiologic investigations which eventually documented two additional major epidemics of clam-associated infectious hepatitis, with 119 and 252 cases respectively.^{20,21}

TABLE 1

Transmission of Infectious Hepatitis (Virus A)

1. Person to person, fecal-oral route
2. Ingestion of contaminated water or food, including raw shellfish from polluted and contaminated water
3. Parenteral

Table 2 summarizes the epidemics and sporadic cases of shellfish-associated infectious hepatitis in the literature. We found record of 1623 cases of infectious hepatitis attributed to the ingestion of raw or steamed shellfish between 1955 and 1971.

Epidemiological Characteristics

All epidemics showed a similar pattern:

1. The patients started to have symptoms of infectious hepatitis 15-60 days after ingestion of the shellfish. Fifty percent of the patients got sick between day 29 and day 36.
2. The infective shellfish could be traced in most cases to a polluted area of the coast.
3. During these epidemics of infectious hepatitis, the number of patients infected by shellfish, and the number of patients who acquired the disease by person-to-person contact was about the same, i.e., ingestion of raw shellfish or steamed clams seemed to be as common a

source of infection as contact with jaundiced persons.

4. Fried shellfish have not been found to transmit infectious hepatitis.
5. Australia antigen was negative in all patients, when tested. None of the cases was tested for EHAA (Epidemic hepatitis associated antigen-Milan).

Clinical Characteristics and Features of Infectious Hepatitis Caused by Ingestion of Raw Shellfish

All ages were affected, but as expected, adult males of the higher social groups made up the biggest percentage. The onset of symptoms was usually abrupt, but the disease generally mild, although some of the adult cases had prolonged icterus which lasted four to six weeks. To our knowledge, there have been no cases reported of chronic active hepatitis after infectious hepatitis caused by ingestion of raw shellfish. There were only a few fatalities. Only icteric cases were included, but many anicteric cases were suspected by impaired liver function tests. Frequently the fever rose above 38° C (100.4° F). Abdominal pain and arthralgia were infrequent. Laboratory tests usually showed positive urine bilirubin, elevated serum bilirubin, abnormal cephalin flocculation and thymol turbidity, marked elevation of SGOT and normal or only mildly elevated alkaline phosphatase.

Once the jaundice is present, it may be difficult to differentiate between infectious and serum hepatitis. Table 3 compares the typical features of infectious and serum hepatitis.

Comment

Oysters and clams are the only types of seafood commonly ingested uncooked. They are also one of the few food items in which the entire animal, including the gastrointestinal tract and its contents, are eaten. These two facts in combination with the ecology and physiology of these shellfish

TABLE 2
Cases of Seafood Related Hepatitis

Year	Type of Shellfish	Number of Cases	Localization	Author
1955	Oysters	629	Sweden	Roos ¹⁸
1961	Oysters	84	Miss/Ala	Mason/McLean ¹⁹
1961	Clams	459	NJ/NY	Dougherty/Altman ¹⁰
1963	Clams	252	Pa/NJ	Commun. Dis. Center ²⁰
1963	Clams	119	Conn/RI	Commun. Dis. Center ²¹
1963 to 1966	Shellfish	46	Boston	Koff ²²
1968 to 1971	Shellfish	34	Frankfurt, Germany	Stille ²³

uniquely equips them for transfer of disease with fecal-oral route of spread.^{25,26}

A question of practical significance relates to the amount of cooking necessary to inactivate the virus. Limited numbers of transmission experiments in human volunteers have shown that the agent can withstand heating to 56° C (132.8° F) for thirty minutes. Unfortunately, many people

consider the mollusk to be fully cooked when the shell opens, although it has been observed that the internal tissue temperature of steamed soft-shell clams at the time of the shell opening is always below 70° C (158° F).²⁷ It is also held that the shorter the steaming period, the more succulent the shellfish.

Until the agent of infectious hepatitis is avail-

TABLE 3
Different Features of Infectious Hepatitis and "Serum Hepatitis"

Feature	Infectious Hepatitis	"Serum Hepatitis"
Route of Infection	Mainly fecal-oral, but also parenteral	Mainly parenteral, but also fecal-oral
Incubation Period	29-36 days, no difference in oral or parenteral route of infection	35-200 days ^{16,17} 65 days after parenteral exposure 98 days after oral infection
Clinical Features:		
Onset	Usually abrupt	Usually slow and insidious
Anorexia	Present	Usually absent
Abdominal pain	Infrequent	Frequently appearing after 1-2 weeks
Ambulation	Usually non-ambulant	Usually ambulant
Arthralgia	Usually insignificant or absent	As early as three to four weeks before the onset of jaundice, particularly in small joints and at night
Ratio of icteric to anicteric	About 1:1 in adults About 1:12 in children	About 1:100
Fever over 38° C	Common	Less common
Mortality rate	0.1-0.3% in young adults, higher in older individuals, especially in women after menopause	Up to 1%
Duration of infectivity and carrier state	Blood: for days Feces: for weeks to months	Blood: for months to years Feces: undetermined
Prophylactic value of gamma globulin	Good	Variable results
Diagnostic biochemical and serological tests:		
SGOT	Spiking rise and short duration of elevated activity (1-3 weeks)	Gradual rise and long duration (up to six months)
Thymol turbidity IgM	Consistently abnormal High increase 3-4 days before abnormal SGOT, return to normal 5-35 days later	Relatively normal Slight increase during acute stage
Au Antigen/Antibody	Negative	Positive 30-80 days after exposure in blood, urine & feces, only transient in 65%
EHAA (Milan)	Positive ²⁴	Negative

able for in-vitro studies, the exact duration of cooking necessary to ensure safety from hepatitis will not be known. Only frying of the shellfish appears certain to inactivate the virus.

The continued occurrence of epidemics of shellfish-related hepatitis indicates the need for strict enforcement of regulations governing harvesting,

storing, and distribution of mollusks. This becomes more and more difficult with the increase of pollution of the seawater along the coasts. Therefore, it is very important to obtain a careful history from each patient with viral hepatitis, in order to detect an epidemic as early as possible.

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This shall be the law of the leper in the day of his cleansing: He shall be brought unto the priest: And the priest shall go forth out of the camp; and the priest shall look, and, behold, if the plague of leprosy be healed in the leper; Then shall the priest command to take for him that is to be cleansed two birds alive and clean, and cedar wood, and scarlet, and hyssop: And the priest shall command that one of the birds be killed in an earthen vessel over running water: As for the living bird, he shall take it, and the cedar wood, and the scarlet, and the hyssop, and shall dip them and the living bird in the blood of the bird that was killed over the running water: And he shall sprinkle upon him that is to be cleansed from the leprosy seven times, and shall pronounce him clean and shall let the living bird loose into the open field. And he that is to be cleansed shall wash his clothes, and shave off all his hair, and wash himself in water, that he may be clean: and after that he shall come into the camp, and shall tarry abroad out of his tent seven days. But it shall be on the seventh day, that he shall shave all his hair off his head and his beard and his eyebrows, even all his hair he shall shave off: and he shall wash his clothes, also he shall wash his flesh in water, and he shall be clean.*

*Leviticus 14, 2-9.

Hamartoma of the Hepatic Bile Ducts

LUIS H. TOLEDO-PEREYRA, M.D., ROBERT L. GOODALE, JR., M.D.,
JOHN S. NAJARIAN, M.D. AND PATRICK WARD, M.D.

BENIGN NEOPLASM of the extrahepatic ducts are rare. As of 1962⁶ only 73 histologically confirmed cases have been recorded. In 29 cases reported by Chu in 1950,⁴ 16 were adenomas, 10 papillomas or polyps, two neuromas, and one fibroma. Other benign tumors of the extrahepatic biliary ducts include: a leiomyoma, a cystic papilloma¹ and granular cell myoblastoma.⁵ The largest benign tumor reported was a 750 gm papillomatous tumor from the common duct of a four year old child.⁹ This case presentation is the second reported hamartoma of the hepatic bile ducts⁶ and demonstrates some unusual difficulties associated with surgical removal.

Case Report

An 18-year-old obese female was admitted in July, 1970, because of painless jaundice, dark urine, light stools, weakness and anorexia. There was no family history of jaundice, no known exposure to hepato-toxic agents. Oral cholecystogram revealed a non-visualizing gallbladder. An exploratory laparotomy and cholecystectomy was done on July 31, 1970. At the time of surgery a gallbladder without stones was found. A common duct exploration was then performed and a soft, smooth, brownish tumor mass was found in the common hepatic duct at the junction of right and left hepatic ducts. This mass was removed grossly by curette and a T-tube was placed in the common duct. Histologically this was thought to be a primary hamartoma. Jaundice subsided postoperatively. Eight months postoperatively however, a T-tube cholangiogram showed apparent re-growth of the tumor (Figure 1) and jaundice recurred.

Second Admission

The patient was then referred to the University of Minnesota Hospitals. Liver function studies confirmed obstructive jaundice. Total bilirubin was 5.9mg%. Alkaline phosphatase was 283 King Armstrong Units. LDH was 197, SGOT was 198. A liver biopsy showed periportal fibrosis with bile stasis consistent with moderate biliary cirrhosis. On April 1, 1971 after losing 50 lbs, the patient was re-explored and the hilus of the liver was

incised for exposure of the right and left intrahepatic ducts. The common and left hepatic ducts were opened linearly 3 cm. A smooth brown tumor 2 cm diameter attached to the medial wall of the left hepatic duct was removed by cannon endarterectomy instrument. The site of tumor attachment to the wall was electrofulgurated to destroy residual tumor cells. (The histologic report was hamartoma, Figure 2). The two split limbs of a number 26 Fr T-tube were inserted in each hepatic duct to act as stents for the primary duct repair.

Her postoperative course was complicated by the development of acute renal tubular necrosis secondary to Cephaloridine therapy. Fortunately, tubular function returned rapidly, and she was discharged from the hospital on the twenty-second postoperative day. Her liver and renal function studies were normal at the time of discharge. A T-tube cholangiogram two months after surgery, showed filling of both ducts and no evidence of recurrence (Figure 3). The T-tube was removed 10 months after surgery.



Fig. 1—T-tube cholangiogram shows dilatation of the common duct, a filling defect of the left hepatic and common duct and complete obstruction of the right hepatic bile duct from the hamartoma.

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The authors are grateful to Dr. R. H. Meyer, of Faribault, Minnesota for referring this patient and for permitting us to use the material for publication.

Address reprint requests to: Dr. Toledo-Pereyra, Department of Surgery, P.O. Box 223, University Hospitals, Minneapolis 55455.

Third Admission

The patient was re-admitted on November 6, 1972 with mild jaundice and pruritus. A retrograde biliary ductogram was performed with an Olympus JF Duodenoscope. A lobulated hepatic filling defect in the common hepatic duct was found. The common duct was re-explored and a polypoid tumor was found arising from the inferior aspect of the posterior segment of the right hepatic duct. The histological diagnosis again was hamartoma. Because of the benign histological diagnosis and the intrahepatic location of this tumor, no further resection was attempted at this time. A #12 Lahey latex tube was left in place. This patient has made a satisfactory convalescence and jaundice has subsided.

Discussion*Pathology*

Benign neoplasms of the extrahepatic ducts are rare, difficult to diagnose, and to treat. Of the 29 cases histologically confirmed by Chu (1950) only two were successfully treated surgically.⁴ In no case was the correct diagnosis made pre-operatively.

In the most recent review by Dowdy⁶ (1962) 43 authenticated additional cases were uncovered. Of those cases four were multi-centric. All four were papillomas in intrahepatic ducts as well as in extrahepatic ducts, and of these there was one survivor. The intrahepatic papilloma in that case was confined to the left lobe of the liver and a left hepatectomy was successfully performed.²

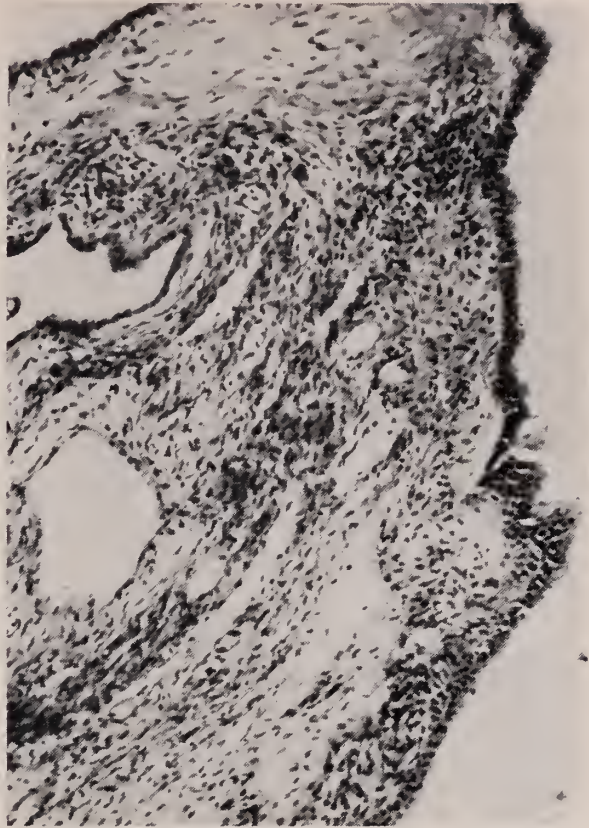


Fig. 2—(X90) Polypoid hamartoma covered by flat cuboidal bile duct epithelium. Glandular spaces are also lined by epithelium of this type. The stroma is composed of fibrous and smooth muscle elements. No mitotic figures are seen.



Fig. 3—T-tube cholangiogram two months postoperative demonstrating normal filling of both hepatic and common bile ducts.

Symptoms and Diagnosis

In Dowdy's review,⁶ jaundice was the predominating symptom appearing in 90% of the cases. In 42% of the cases jaundice was intermittent. Pain was the next most common symptom (81%). Other symptoms occurring less frequently included dyspepsia, fever, chills, weight loss and hemobilia.^{3,4,6,8,10} The liver was enlarged and palpable in a large percent of the cases due to an obstruction of the bile ducts. The gallbladder was enlarged and palpable as a rule when the tumor was below the origin of the cystic duct and obstruction was present. Only rarely were these tumors palpable. One should be suspicious when intermittent jaundice is present with a normal cholecystogram. Intravenous cholangiography is not too helpful since most of the patients are deeply jaundiced at the time of the study.⁴ Even at the time of surgery, it may be difficult to find these benign tumors because they are soft. A probe may be easily passed through the area of the tumor, therefore, palpation of the bile ducts and sometimes duodenotomy are important in detecting them. The treatment of choice is local excision.

The hamartoma reported by Dowdy et al. was a 43-year-old white woman with an obstructive jaundice of one month duration. There was marked liver damage. The operative findings were:

cholestasis of the liver, multiple bile retention cysts and a grayish, lobulated polypoid hamartoma protruding into the lumen of the hepatic bile duct. After removal of the tumor a T-tube was left in place and removed 18 months later, after a normal cholangiogram. The present case represents the second hamartoma of the biliary ductal system reported.

The items of interest in our case were the initial findings which were atypical of calculous disease. Painless jaundice in a young patient with a non-calculous gallbladder and absence of pancreatitis should alert the surgeon to the possibility of tumor in the biliary tree. The advent of fiberoptic duodenoscopy with retrograde biliary ductograms may facilitate the diagnosis.

It is also apparent that benign tumors can grow at a rapid rate, and re-obstruct the biliary tree. The intrahepatic location of tumors can be such as to cause difficulty in removal. Often incision deep into the hepatic hilus may be necessary as in this case. Future recurrence of tumor in our case may indicate the necessity of a hepatic lobectomy, however at this point we are unable to state which lobe may have to be removed. We believe that these episodes of obstructive jaundice are on the basis of multi-centric tumor rather than recurrence from the same primary.

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Pediatric's Day

Pediatric Day will be held March 3, 1973 at the Mayo Clinic. The program will be comprised of a series of talks by the faculty relating to problems in pediatric practice. Doctor Warren E. Wheeler, Professor and Chairman of the Department of Pediatrics, University of Kentucky will be the guest speaker and will talk on the approach to problems of failure to thrive. For information, write Dr. E. C. Burke, Mayo Clinic, Rochester, Minnesota 55901.

Melanomatous Meningiomas

LEONARD A. TITRUD, M.D.

TWO PATIENTS HAVING primary malignant melanomatous meningiomas are presented. The symptomatology and clinical progress following surgery is described. These rare tumors seem uniformly resistive to cure by surgical or radiation therapy.

Melanomatous meningiomas are rare primary tumors which grow within or about the brain and spinal cord. Some of these tumors involve the meninges while others are intrinsic within the central nervous tissue. They are invasive and malignant, but do not seem to metastasize outside of the nervous system. Their histologic appearance has features of both meningioma and melanoma.

Normally melanin pigment granules occur in the pia mater of human adults and appear evident mostly over the ventral aspect of the lower medulla oblongata. Melanin containing cells may surround perforating vessels in areas of the brain which have pigmented leptomeninges constituting the appearance of melanosis. Such a condition is sometimes associated with cutaneous cafe-au-lait areas and is a benign condition.¹ Gibson, et al. in 1957 reviewed the problem of primary CNS melanomas and found 60 acceptable reported cases. In 1961, Kiel, et al.³ found in the literature a total of 86 valid melanomas of the central nervous system. The nature of these tumors have been amply described in other case reports also.⁴⁻¹⁰ These tumors occur during all ages of life with maximum prevalence in the fourth decade.²

Two case reports are presented here. The nature of, and the course of illness before and after treatment is quite typical for this type of tumor.

Case Reports

Case 1—41-year-old female.

History:

Onset of headaches, blurred vision and dizziness in September 1949 followed by left face and tongue numbness. Later there developed anorexia, weight loss and poor balance. Since 1940 the patient had experienced

Dr. Titrud practices in Minneapolis, Minnesota.

progressive left deafness and tinnitus. Recently the left arm and leg had become numb and the patient had become tired and weak.

Examination February 1950:

On neurologic examination there was horizontal nystagmus more prominent to the left but also vertical nystagmus. There was slight left peripheral facial weakness. Left air conduction hearing was absent and the left trigeminal divisions were hypesthetic. Additionally left arm hyperreflexia and ataxia existed.

The patient was hospitalized in March, 1950. Skull Xrays were normal. In the absence of papilloedema, a lumbar puncture obtained cerebrospinal fluid (CSF) containing 122 red blood cells, 66.2 mgm.% protein.

On 7 March, 1950, a left posterior craniotomy revealed no increase of intracranial pressure. In the left cerebellopontine angle there were large veins about the seventh and eighth cranial nerves where there was well

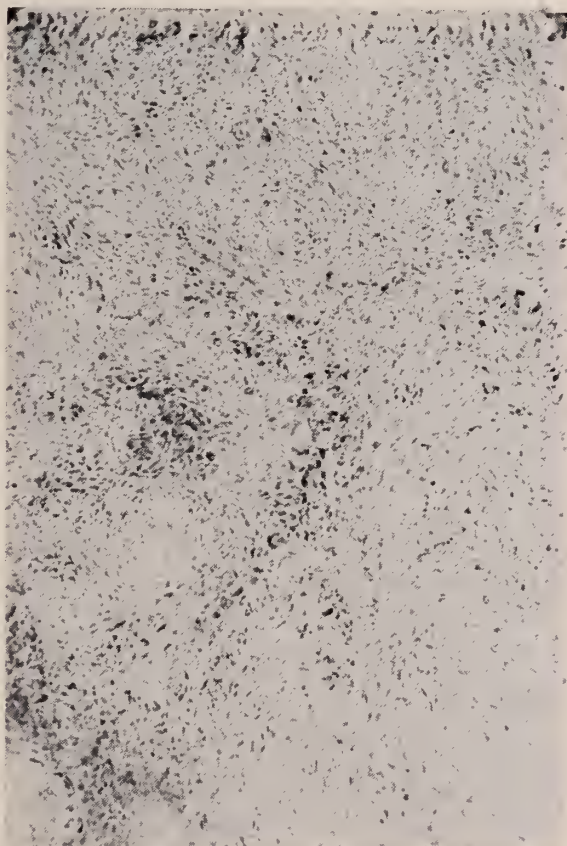


Fig. 1 (Case 1)—Low power photomicrograph shows the fibrous stroma of a meningioma with scattered pigment granules.

vascularized tissue extending into the cerebellar hemisphere. Much of this tissue was soft, necrotic and somewhat blue in color, suggestive of a hemorrhagic process. Eventually a 3 x 4 x 5 cm. tumor was removed without particular disturbance of the V, VII and VIII cranial nerves.

The pathologist found that this vascular tumor had relatively uniform cells with oval nuclei which stained moderately and were surrounded by an indefinite amount of granular cytoplasm. The vascular spaces had endothelial lining with the tumor cells resting on the endothelium. The tumor cells infiltrated into thickened tissue of a fibrous type resembling the meninges. There were dark brown irregular sized pigment granules scattered throughout the tumor. Special iron stains of this vascular tumor showed many deposits of iron-containing pigment, but there were fairly large deposits of a separate pigment which were free of iron. Mitotic figures were present but not numerous. The diagnosis was that of Meningeal Melanoma.

Postoperative radiation therapy was administered. In May, 1950, the patient developed tinnitus and recovery of hearing. There was almost no facial weakness. There was some left corneal and mandibular hypesthesia. The left upper extremity retained some ataxia and weakness.

In July 1955 the patient was hospitalized again. Her progress had been good, but over the past year she had become somewhat ataxic. There were no headaches. In June the patient had developed left face, ear, and suboccipital pain and neck stiffness together with nausea and vomiting.

Examination revealed mild neck rigidity. The left pupil was slightly dilated. Nystagmoid movements occurred in all directions. There was reduction of left hearing and left corneal sensation together with left facial weakness. The left arm and leg were ataxic and hyper-reflexia. There were bilateral Babinski toe signs. The patient improved with bed rest and returned home.

On December 12, 1955 the patient was again hospitalized. Her progress had been satisfactory until early December when she developed a severe headache and numbness over the entire body. Her speech was lost, right hemiplegia developed, and she became unconscious. The spinal fluid was found to be bloody. She expired on December 15, 1955. A complete autopsy was done. There was a large necrotic and hemorrhagic recurrent tumor in the left cerebello-pontine angle with brain stem compression. No other significant findings were found.

Case 2—74-year-old white male.

This man was hospitalized from 15 July until 30 July, 1971. He had developed some mental confusion and disorientation over the preceding two months. There had been two weeks of recent headache associated with visual blurring. Recent clumsiness of the left extremities had also occurred. Past health had been excellent.

Examination revealed the patient to be confused and disoriented. Physical and neurological examinations were normal. Electroencephalography was abnormal with diffuse slowing. A brain scan demonstrated increased activity in the posterior and inferior aspect of the right parietal area extending toward the midline. Carotid angiography revealed an area of relative avascularity in

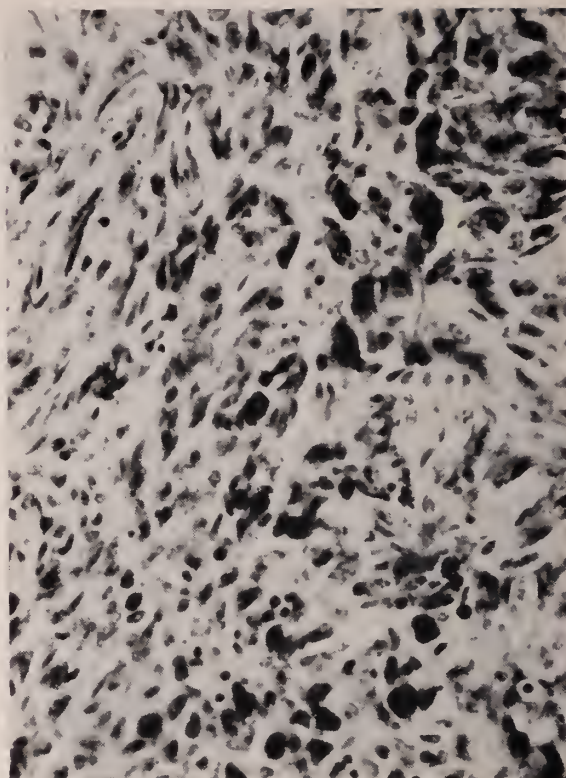


Fig. 2 (Case 1)—High power demonstrates irregular cell formation and pigment granules.

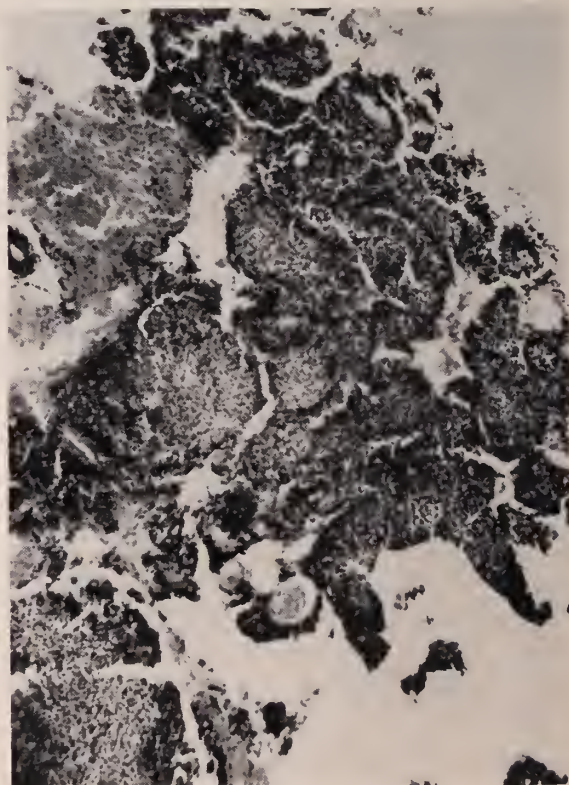


Fig. 3 (Case 2)—Low power photomicrograph shows whorl formation and fibrous appearance of a meningioma.

he posterior and inferior distribution of the right middle cerebral branches. There was no vascular displacement.

A ventriculogram was carried out and the right brain cannula entered a cavity containing golden-yellow fluid that rapidly coagulated. A right parietal craniotomy revealed prominent increase of intracranial pressure. A large cavity was found adjacent to the lateral ventricle in the right parieto-occipital area containing what appeared to be clotted blood. These clots and necrotic tissue were removed providing a generous decompression. The post-operative course was gratifying. The patient was alert and was soon ambulatory. Hospital discharge was July 30th. No radiation therapy was administered.

Pathologic examination of the operative specimen demonstrated the hemorrhagic and necrotic tissue to have spindle shaped and cuboidal neoplastic cells. These malignant cells appeared to invade into the normal brain tissue and in these areas to contain an increased amount of pigment. The pigment was almost black and was distributed throughout the tumor in an irregular pattern. In some regions the cells seemed to form whorls along with areas of hemorrhage. The diagnosis was Malignant Meningioma, Melanomatous type.

This man returned to his local hospital 30 July, 1971 and appeared to get along quite well except for occasional fatigue, confusion and headache. In August, 1971, after a few hours of high fever, the patient suddenly expired. Unfortunately, no autopsy was done. Prior external medical examination of the patient had failed to reveal any tumor except the one involving the brain.

Summary

Two case reports of melanomatous meningiomas are added to the relatively few reported in the literature. One of these tumors was deep within the brain adjacent to the lateral ventricle which is a very uncommon location for a meningioma. Neither surgical or radiation treatment appears to

halt the course of these tumors. Additionally Williams⁸ reported the unsuccessful use of vincristine in a case of this sort. It is hoped that some form of chemotherapy may become available for all malignant brain and spinal cord tumors.

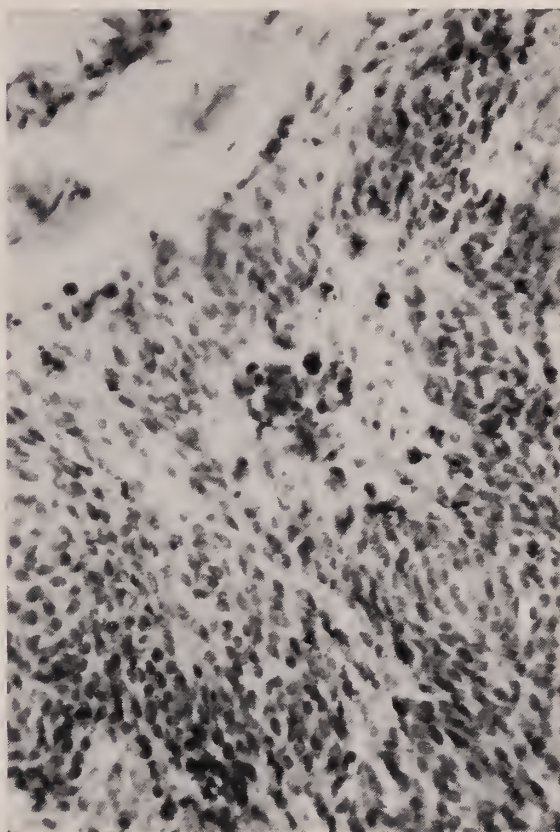


Fig. 4 (Case 2)—High power photomicrograph demonstrates pigment granules among the spindle cells of the tumor.

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Dr. H. L. Huffington

Herb L. Huffington, M.D., of Waterville, has been elected to a three year term as Director of the American Academy of Family Physicians.

The American Academy of Family Physicians, the world's second largest medical organization, has a membership of 32,000 and represents the family doctors of the country.

Doctor Huffington is known throughout the state as a member of the Board of Regents of the University of Minnesota where he has been an advocate of the development and expansion of training programs designed to increase the number of physicians in the rural areas of the state.

University of Minnesota

Office of Postgraduate Medical Education—Medical School
Continuing Medical Education Courses 1972-73

February

- The Emergency Room—Its Organization and ManagementFebruary 15-17
Practical OtolaryngologyFebruary 19-22

March

- Clinical TherapeuticsMarch 1-3
The Evaluation of the Newborn and Preschool ChildMarch 20-21
Pediatric DermatologyMarch 22-24
Office PsychiatryMarch 29-31

April

- The Clinical Allergist and Immunologist—1973April 5-7
Medical Technology's Golden Anniversary: Looking AheadApril 25-27
Retinal DiseasesApril 30-May 1

May

- Therapeutic Radiology—External Beam
Techniques Part II and RadiumMay 16-18
Surgery of the Gastrointestinal TractMay 30-June 2

June

- The Second Annual Bell Symposium,
"The Pathobiology of Trauma"June 4-6

Additional courses may be announced during the year.

For further information concerning the above listed programs and opportunities contact: Director, Postgraduate Medical Education, Box 193 Health Sciences Center, University of Minnesota, Minneapolis, Minnesota 55455.

Postgraduate Course on the Small Intestine and Colon

Third annual course in Gastroenterology will be presented by the Graduate Medical Education Department of the Alton Ochsner Medical Foundation with distinguished faculty of visiting professors, local area guests and the staff of the Ochsner Medical Center at the Ochsner Medical Center, February 1, 2, 3, 1973.

Consideration is given this year to disease problems of the small bowel and colon with approach from the standpoint of newer developments in the patho-physiologic processes of these conditions.

Inquiries concerning this course should be directed to: William H. McFarland, Administrator, Alton Ochsner Medical Foundation, Graduate Medical Education Department, 1514 Jefferson Highway, New Orleans, Louisiana 70121.

Acute Perforating Diverticulitis

Emergency Surgical Treatment

PETER ENDREY-WALDER, M.B., B.S. AND EDWARD S. JUDD, M.D.

IN RECENT YEARS, steady progress has been made toward establishing principles in the surgery of chronic or recurrent diverticulitis of the colon,^{1,2} which in the elective cases has resulted in satisfactory morbidity and mortality rates.³ Occasionally the surgeon is confronted with an acute problem for which time does not permit the orderly, complete preparation of the colon and the patient. In the acute situation the surgeon must decide among several possibilities, each with a known risk factor. If a frank abscess is present, drainage is mandatory and a proximal colostomy is the accepted procedure. If the perforated bowel can be mobilized, several choices are available: (1) an obstructive or extraperitoneal resection (a modification of the earlier exteriorization operation) may be done; (2) the lesion may be resected, the rectosigmoid being closed as a stump and a temporary single-barrel colostomy being carried out with the proximal colon for later reestablishment of continuity (Hartmann method); (3) the lesion may be resected and the end-to-end anastomosis protected with a temporary proximal colostomy; (4) a primary resection and immediate anastomosis without colostomy may be done.

Because we had no current information of our results with surgical management of this acute problem, we analyzed our experience over a recent decade.

Material

Our material was selected from the records of 775 patients who had undergone surgery for diverticular disease of the colon during the 10-year period between 1961 and 1970. There were two criteria for inclusion in the series: (1) The surgical procedure was an emergency (this excluded any planned work-up, bowel preparation, etc., but not

immediate preoperative resuscitation) and (2) there was evidence of perforation, either as a recognized defect in the colon wall at operation or as a pericolic or mesocolic abscess (as a consequence of acute diverticulitis) on examination of the excised specimen.

Fifty-four cases met these criteria: there were 27 men, with an average age of 57 years (range 42 to 84 years) and 27 women, with an average age of 61 years (range 31 to 83 years).

Preoperative Condition of Patients

The degree of surgical risk immediately before operation was used to classify the patients. Because classification was done retrospectively, it was based on such parameters as chronologic age, concurrent diseases, or medications (for example, steroid treatment) as well as on data, such as blood pressure readings, pulse rate, estimated degree of dehydration, and electrocardiographic findings.

Only one patient was in poor enough condition to have been refused a general anesthetic, and he was the only one classified as a very bad risk. The condition of 20 patients was poor because of advanced ischemic heart disease, severe diabetes, prolonged high dosage steroid treatment, other severe concurrent diseases, and advanced peritoneal infection; these patients made up 40% of the series.

The duration of acute symptoms or of symptoms whose severity had gradually increased to a maximum, necessitating surgical intervention, averaged four days. Patients who died during their initial hospitalization suffered from such

TABLE 1
Preoperative Risk and Mortality in 54 Cases of
Emergency Acute Perforating Diverticulitis

Risk	No. of patients	Deaths	
		No.	%
Very bad	1	1	100
Moderately bad	20	8	40
Good	33	2	6
Total	54	11	20

Mayo Clinic and Mayo Foundation, Rochester, Minnesota.
Read at the meeting of the Minnesota Surgical Society, Rochester, Minnesota, May 5, 1972.

symptoms for an average of seven days and had more advanced local or generalized peritoneal involvement.

The relationship of preoperative risk to mortality is shown in Table 1.

Operative Findings

Although the operative findings were difficult to compare, there were two basically different groups of patients: (1) those with apparently localized changes in the pericolic or mesocolic region and (2) those with generalized peritonitis or distal abscesses. Because generalized peritonitis is not in itself a surgically treatable condition, and because the mortality rate was only 3.8% (one patient) when the infection was localized, as compared to a rate of 35.6% when it was not, there was no decisive preference for any of the various forms of standard surgical management.

The relationship of findings at surgery to mortality is shown in Table 2.

TABLE 2
Findings at Laparotomy and Mortality in
54 Cases of Emergency Acute Perforating
Diverticulitis

Finding	No. of patients	Deaths No.	%
Generalized peritonitis	28	10	35.6
Pericolic and/or mesocolic abscess	26	1	3.8
Total	54	11	20.4

Surgical Procedures

The results of the operative procedures in the two groups of patients were analyzed (Table 3). When generalized peritonitis was present, the mortality rates were similar when the various resective measures were compared with the simpler colostomy and drainage. This was also true when the changes were localized. None of the 19 patients who underwent defunctioning colostomy or drainage (or both) developed overwhelming peritonitis. The combination of diversion of feces, draining localized abscess, antibiotics, and other supportive measures seemed to prevent further spread of infection.

Analysis of Mortality

Eleven of the 54 patients died (Table 4). Ten of the 11 had generalized peritonitis at laparotomy, and this contributed significantly to the deaths of nine. Two patients (Cases 4 and 5) were extremely ill; one (Case 4) had survived three episodes of

rejection of a renal transplant in the previous six months. He was treated with high doses of immunosuppressants as well as steroids. The other (Case 5) was responding slowly to splenectomy that had been performed two weeks earlier for the acute hemolytic crisis of systemic lupus erythematosus. Significantly, eight of the nine patients who were receiving cortisone had generalized peritonitis, and six of these died. Peritonitis was the most important prognostic factor. All but one of the patients who were on steroid medication had peritonitis. A significantly higher average age (66 years for those who died as opposed to 57 years for those who survived) was also a poor prognostic feature.

Causes of Death and Nature of Complications

Uncontrollable infection was an important cause of death; however, most of those who died had many contributing conditions (Table 5).

Of the postoperative complications, wound infection was the most frequent, afflicting 23 (42%) patients (Table 6). Most of the wounds were closed primarily; possibly initial packing of the wound, followed by secondary closure, might have reduced the percentage of infection.

Fecal fistulas developed in four patients: one each after transverse defunctioning colostomy plus drainage, after sigmoid resection with defunctioning colostomy, after left hemicolectomy, and after sigmoid resection without colostomy (the last two eventually were self-healing). Thus this complica-

TABLE 3
Surgical Procedures in 54 Cases of Emergency
Acute Perforating Diverticulitis

Laparotomy finding	Procedure	No. of patients	Deaths No.	%
Peritonitis	Defunctioning loop colostomy and drainage	22	8	36.3
	Resection, colocolos- tomy, and defunc- tioning loop colostomy	3	0	33.3
	Resection and colocolos- tomy	2	1	
	Hartmann	1	1	
Mesocolic or pericolic abscess	Defunctioning loop colostomy and drainage	19	0	0
	Resection, colocolos- tomy, and defunc- tioning loop colostomy	1	0	14.2
	Resection and colo- colostomy	5	0	
	Hartmann	1	1	
Total		54	11	20.4

TABLE 4
Analysis in 11 Fatal Cases of Acute Perforating Diverticulitis Involving Emergency Surgical Procedures

Case	Sex and age, yr	Duration of symptoms, days	Associated conditions	Pathologic findings	Surgical procedure	Postoperative complication	Cause of death	Time of death, postop. day
1	F, 81	2	Temporal arteritis (steroids)	Peritonitis	Loop transverse colostomy and drainage	Septicemia, atrial fib., acute renal failure	Peritonitis, pulmonary embolus	27
2	F, 79	< 1	—	Peritonitis	Loop sigmoid colostomy and drainage	Evisceration closed 8th postop. day	Bronchopneumonia	32
3	F, 79	< 1	—	Peridiverticular abscess	Hartmann	Oliguria, toxic encephalopathy	Peritonitis, encephalopathy	8
4	M, 56	5	Kidney transplant, steroids, immunosuppressants	Peritonitis	Loop sigmoid colostomy and drainage	Septicemia, wound dehiscence (twice, 6th & 29th postop. days)	Peritonitis, septicemia	35
5	F, 63	< 1	Acute hemolytic anemia (SLE), steroids, 2 wk postsplenectomy	Peritonitis	Loop sigmoid colostomy and drainage	—	Peritonitis, pulmonary embolus	22
6	F, 84	1	Depression, Parkinsonism	Peritonitis	Loop sigmoid colostomy and drainage	Septicemia, wound dehiscence, resp. failure, tracheotomy, 3rd postop. day	Peritonitis, bronchopneumonia	14
7	M, 42	14	Jaundice, pyothorax, extreme dehydration	Peritonitis	Loop transverse colostomy and drainage	Septicemia	Peritonitis, septicemia	3
8	M, 75	18	Incarcerated inguinal hernia	Peritonitis	Loop transverse colostomy and drainage; hernia repair	Septicemia, resp. failure, tracheotomy 3rd postop. day	Peritonitis, bronchopneumonia	12
9	M, 55	8	Metastatic carcinoma of brain, steroids	Peritonitis	Loop transverse colostomy and drainage	—	Peritonitis, pneumonia	23
10	F, 42	28	Pemphigus vulgaris, steroids	Peritonitis	L. hemicolectomy	Breakdown, colectomy, rt. hemicolectomy and ileostomy, 6 wk postop.	Peritonitis, septicemia	43
11	M, 75	< 1	Emphysema, steroids	Peritonitis	Hartmann	Resp. failure, tracheotomy, 3rd postop. day	Peritonitis, septicemia, bronchopneumonia	4

TABLE 5
Causes of Death in 11 Cases of

Cause	Patients
Overwhelming peritonitis	10
Bronchopneumonia	5
Septicemia	4
Pulmonary Embolus	2
Encephalopathy	2

TABLE 6
Complications in 54 Cases of
Emergency Acute Perforating Diverticulitis

Complication	Patients
Wound infection	23
Fecal fistula	4
Heart failure	3
Respiratory failure	3
Sural thrombophlebitis	2
Renal failure	2

TABLE 7
Morbidity in 36 Cases of
Emergency Acute Perforating Diverticulitis

Operations	Hospitalization, days	Interval,* days
Defunctioning colostomy, resection, closure of stoma (3 stages)	51	180
Defunctioning colostomy, resection, closure of stoma	33	120
Defunctioning colostomy plus resection, closure of stoma	36	150
Resection	15	15

*Between emergency surgery and final dismissal.

tion developed after only one of the 41 nonresective operations, but after three of the 11 resections with primary anastomosis.

Morbidity

Hospital morbidity data (Table 7) did not include the 11 patients who died during the initial hospitalization, two patients who died prior to completion of further surgery, three patients who declined further treatment, and two patients who were lost to follow-up; all of these 18 patients had some form of defunctioning colostomy and drainage.

The two patients who died prior to resection and closure of the colostomy died in the interval period from causes other than diverticular disease, and none of those who later underwent definitive surgery died as a consequence of such an operation.

Summary

From 1961 to 1970, 775 patients underwent surgical treatment for diverticular disease of the colon. Only 54 of these underwent emergency surgical treatment, which precluded any planned preparation of the colon. All 54 had evidence of a perforated colon. For those in the good-risk category, the hospital mortality was much lower. If general peritonitis was present, the mortality rate was 35.6%. If the infection was localized, the rate was 3.8%. Various surgical procedures were employed, but none was superior.

Significant contributing factors to mortality were the use of steroids and advanced age (average 66 years). The leading complication was wound infection. Packing the wound, with delayed closure, is worth considering.

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Duplay's Syndrome

This commonly observed calcifying tendinitis or peritendinitis involving the shoulder area constitutes one of the etiologic components of the supraspinatus syndrome. It was first described by Duplay (1896) as "scapulohumeral periarthrititis."

Cardinal symptoms consist of pain and limitation of motion of the shoulder joint. Calcification is frequently present in both shoulders and may long be asymptomatic. When pain does occur, it may be quite intense and often prevents sleep despite generous doses of narcotics. Three varieties of "frozen shoulder" have been described: (1) a localized form with general articular involvement, in persons under 40 years of age; (2) a degenerative form, in persons over 40 years of age; and (3) a posttraumatic form from a tear in the rotation cuff.

One theory concerning cause of the calcium deposition includes occlusion of the vessels of the tendon from hypertrophy of the tunica media. As in aseptic necrosis of the head of the humerus or elsewhere, local necrosis of the tissues occurs, followed by the deposition of calcium. Almost immediate relief may be obtained by opening the tendon capsule surgically. Many cases will respond promptly to the local injection of an anesthetic agent, as procaine and hydrocortisone. Irradiation of the area also affords gradual relief of pain and, in many instances, complete disappearance of the calcific deposit within a few months.

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Hoeber Medical Division, Harper and Row, New York

Colistin Toxicity

Neuromuscular and Renal Manifestations

Two Cases Treated by Hemodialysis

DONALD A. DUNCAN, M.D.

EARLY STUDIES SUGGESTED that colistin (polymixin E), a polypeptide antibiotic isolated from the soil organism *Aerobacillus colistinus*, was relatively non-toxic, especially when compared to polymixin B.^{1,2} Subsequent experience has revealed a high incidence of both neurotoxicity and nephrotoxicity.^{3,4} Neurotoxic manifestations have ranged from mild paresthesias to a generalized neuromuscular blockade resulting in quadriplegia and apnea.^{3,5} Nephrotoxic reactions have included the production of proteinuria, hematuria or cylindruria, impairment of renal concentrating ability, development of non-oliguric renal insufficiency with progressive azotemia, and acute tubular necrosis.^{4,6,7} It now appears that when colistin and polymixin B are given in doses of equal antibacterial effectiveness, their toxicity is similar.⁸

Two patients treated in the Methodist Hospital (Minneapolis, Minnesota) Hemodialysis Center for adverse reactions to colistin are presented to illustrate many aspects of colistin-induced neurotoxicity and nephrotoxicity as well as the effect of hemodialysis on serum concentrations of the drug. Both patients received colistin intramuscularly as the methane sulfonate derivative, sodium colistimethate (Coly-mycin®M). Case 1 received approximately six times the usually recommended dose while Case 2 received an appropriate dose. Neither had evidence of renal disease before colistin was administered.

Materials and Methods

Serum samples from Case 1 were assayed for colistin by a cylinder plate method in which *Bordetella bronchiseptica* A.T.C.C. 4617 was used as

the test organism.* Inhibition of bacterial growth by the patient's serum was compared to that produced by known concentrations of colistin base. Results are reported as micrograms of colistin base activity per milliliter of serum tested.

One patient was dialyzed 10 hours with two Cordis-Dow† hollow fiber (capillary) dialyzers arranged in series (Figure 1) to reduce the concentration of colistin in her blood. Each dialyzer received dialysate from an individual Milton-Roy‡ single-pass delivery system at 500 ml/min. Other dialyses for the control of uremia in both patients



Fig. 1 (Case 1)—Two Cordis-Dow capillary dialyzers arranged in series to produce a highly efficient hemodialysis system. Each dialyzer is perfused by a separate dialysate supply system.

‡Milton-Roy Co., St. Petersburg, Florida.

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*Performed by Warner-Lambert Pharmaceutical Co., Morris Plains, New Jersey, through the courtesy of Dr. A. D. Flanagan, Medical Director, Warner-Chilcott Laboratories.

†Cordis Corporation, Miami, Florida.

were performed with either the Ultra-Flo 145 twin coil dialyzer in conjunction with the Travenol RSP* dialysate delivery unit or a modified two-layer Kiil dialyzer attached to the Milton-Roy single-pass delivery system. These dialyses were of six to eight hours duration.

Case Reports

Case 1

A 16-year-old girl weighing 45 kg. was hospitalized elsewhere on July 8, 1971, with acute appendicitis. Urinalysis was normal with specific gravity 1.029. Appendectomy revealed evidence of early perforation. *Escherichia coli* sensitive to colistin, chloramphenicol, nitrofurantoin and streptomycin was cultured from the periappendiceal area. Therapy with colistin and chloramphenicol was started on July 10.

Chloramphenicol was discontinued after a total of 1750 mg. Four injections of 150 mg colistin were given on July 10 at four-hour intervals. The next day six more injections of 150 mg each were given. Over a period of 40 hours the patient received 1500 mg, equivalent to 900 mg/24 hours or 20 mg/kg/day.

By noon, July 11, the patient complained of dizziness when standing. At 7:00 P.M., she exhibited generalized weakness and had difficulty walking. About midnight apprehension and respiratory distress developed. Respirations were shallow at 28/min. By 12:30 A.M., July 12, she was apneic. Resuscitative measures were initiated but cardiac arrest ensued. The pupils dilated and became non-reactive. An endotracheal tube was inserted and external cardiac massage administered for approximately 30 minutes before a regular sinus rhythm was restored. Continuous ventilatory assistance was maintained with a positive-pressure respirator. Colistin was discontinued. Several hours later her condition deteriorated and she was transferred to Methodist Hospital.

Examination at noon, July 12, revealed a deeply comatose, apneic, noncyanotic young girl who required continuous artificial ventilation. Pupils were dilated and non-reactive. There was a flaccid quadriplegia, absence of corneal and deep tendon reflexes, no Babinski reflex and no response to noxious stimuli. The pulse was 120, blood pressure 90/70 mm Hg, and temperature 39.6°. Moist inspiratory rales were audible throughout the left lung. The abdomen was soft with a Penrose drain in the appendectomy incision.

The WBC was 21,600/mm³ with 97% neutrophils. Urinalysis showed 3+ protein, 5 WBC and 15 RBC per high-power field and many granular casts. Hemoglobin was 14.1 g/100 ml, blood urea nitrogen 23 mg/100 ml, sodium 133 mEq, potassium 5.2 mEq, chloride 108 mEq and CO₂ content 14.4 mEq/liter. Chest Xray showed an extensive infiltrate throughout the left lung compatible with an aspiration pneumonia. An initial sputum culture was negative but *Proteus* and *Enterobacter* species were cultured four days later. An electroencephalogram revealed bilateral diffuse slow-wave activity with left frontal-temporal spike foci. The urine volume

averaged only 24 ml/hour prior to the administration of furosemide.

The pneumonia was treated with chloramphenicol, ampicillin and dexamethasone. The hospital course over the next few days was as follows (also see Figure 2 where Day 1 corresponds to July 12, 1971):

July 12, 1971

5:00 P.M.—Occasional spontaneous movements of the hands.

July 13, 1971

6:00 A.M.—Opened eyes on command.

10:00 A.M.—Moved extremities on command. Apneic, pupils dilated, but deep tendon reflexes returning. Urine volume fixed at 50 ml/hour despite 1000 mg furosemide/24 hours in divided doses. Creatinine clearance 1.3 ml/min/1.73m².

11:00 A.M.—Start 10-hour hemodialysis with two capillary dialyzers to remove colistin.

6:00 P.M.—Intermittent spontaneous respirations. Able to speak a few words.

July 14, 1971

8:00 A.M.—Mentally alert. Cyanotic with shallow respirations when artificial ventilation withheld. Altered blood coming from nasogastric tube.

Noon—Respirator discontinued and endotracheal tube removed.

On July 16 hemoptysis without pleuritic pain developed. Two days later tenderness and swelling of the left calf appeared, then gradually subsided following treatment with heat and elevation. By July 19 the chest Xray was normal.

Hemodialyses were performed on July 17 (Day 6, Figure 2) and July 22 to control uremia. Increased upper gastrointestinal hemorrhage occurred on July 23. Subsequent Xray of the stomach and duodenum was normal. The bleeding was believed to be due to uremic gastritis. A final dialysis was performed July 24. A repeat electro-

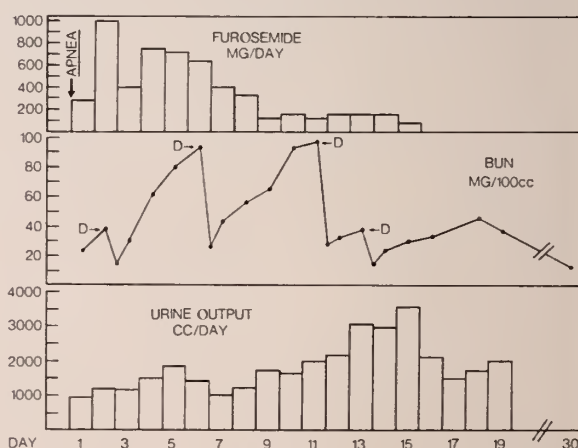


Fig. 2 (Case 1)—Hospital course of patient beginning with onset of apnea after receiving colistin, 150 mg every four hours times 10 doses during the preceding two days. D indicates dialysis. The first dialysis was to remove colistin, the other three to control symptoms of uremia. Relatively large amounts of furosemide produced only a mild but sustained diuresis.

*Travenol Laboratories, Inc., Morton Grove, Illinois.

encephalogram July 26 was normal. By July 30 urinalysis was normal except for a few granular casts. Creatinine clearance was 25 ml/min/1.73 m².

The patient returned to school in September with no obvious mental impairment. An intravenous pyelogram was normal. Creatinine clearance was up to 60 ml/min/1.73 m² by October 28. Extensive psychological testing in November failed to reveal any evidence of neurological dysfunction. On intelligence testing* the patient obtained a verbal IQ of 109, a performance IQ of 108 and an overall full-scale IQ of 109.

Now, eight months following the renal injury, urinalysis is normal with a random specific gravity 1.020, blood urea nitrogen 15 mg/100 ml, serum creatinine 0.9 mg/100 ml and creatinine clearance 71 ml/min/1.73m₂.

Case 2

A 23-year-old woman weighing 60 kg, was hospitalized December 21, 1968, with compound comminuted fractures of the left tibia and fibula incurred in an automobile accident. The wound was debrided, screws inserted and a cast applied. Admission urinalysis was normal with specific gravity 1.018. One week later the fracture site appeared infected. A culture produced *Pseudomonas aeruginosa* sensitive to colistin.

On January 3, 1969, 180 mg (3 mg/kg) colistin was administered in divided doses. On January 4, 5 and 6 the total daily dose given was 240, 180 and 120 mg respectively. Circumoral and acral paresthesias developed on January 5 and progressed the next day, after which the colistin was discontinued.

The daily urine volume since admission exceeded 1500 ml and remained high at 2700 ml on January 6. On this date the blood urea nitrogen was 17 mg/100 ml. Then on January 7 the paresthesias improved but the patient complained of nausea and was noted to be almost totally anuric. Thirty g mannitol intravenously failed to improve renal function. The total 24-hour urine volume was 25 ml.

The patient's subsequent course is shown in Figure 3 where Day 1 corresponds to January 3. Hemodialyses to control symptomatic uremia were performed on Day 8 when the blood urea nitrogen reached 95 mg/100 ml and again on Day 11. After six days of oliguria diuresis began. By January 24 (Day 22) the blood urea nitrogen returned to normal. The fracture site healed slowly after additional debridement and application of skin grafts.

Three years later, January 1972, urinalysis was normal with specific gravity 1.024, blood urea nitrogen 12 mg/100 ml, serum creatinine 0.8 mg/100 ml and creatinine clearance 68 ml/min/1.73 m².

Results

The creatinine clearance of the two hollow fiber dialyzers arranged as shown in Figure 1 was 119 ml/min (115 and 122 ml/min on two determinations) and the urea clearance 155 ml/min (148 and 162 ml/min on two determinations) at a blood flow of 200 ml/min. Under similar conditions the creatinine and urea clearances for a

single hollow fiber dialyzer were found to be 98 and 125 ml/min respectively. Figure 4 shows the effect of dialysis on the serum colistin concentration of Case 1. The rate of fall was greater during the period of dialysis—hours four to 14—than before or after. During the 10 hours of dialysis the serum colistin concentration fell 0.4 mcg/ml/hr compared to 0.044 mcg/ml/hr during the 34 hours post-dialysis. These results suggest that colistin was removed by hemodialysis under the conditions of the present study.

Patient one received four to eight times the recommended dose of 2.5 to 5.0 mg/kg/day of colistin.⁹ Acute renal failure and neuromuscular paralysis manifested by generalized weakness, difficulty walking, apnea and a flaccid quadriplegia resulted. Hypoxic cerebral injury due to the cardio-respiratory arrest may have contributed to the quadriplegia. The serum colistin concentration at

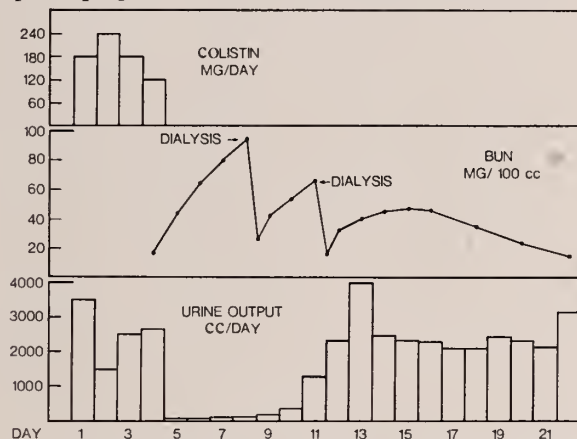


Fig. 3 (Case 2)—Hospital course of patient, beginning with the administration of colistin. Oliguria developed suddenly on Day five and was associated with rapidly progressive azotemia.

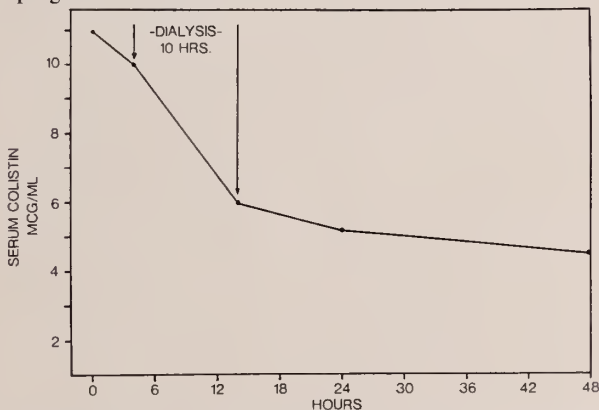


Fig. 4 (Case 1)—Concentration of colistin in the serum of patient before, during and after hemodialysis with the two capillary dialyzers. Time "0 Hours" when the serum colistin concentration first was measured, was 7:00 A.M., July 13, 1971, 31 hours following onset of apnea, and 33 hours after the last injection of colistin.

*Wexler Adult Intelligence Scale.

the time apnea first developed is not known, for the concentration of 10 mcg/ml at time 0 hours in Figure 4 was not obtained until 31 hours later. Despite dialysis 84 hours elapsed following onset of apnea before respiratory function returned completely to normal.

The renal failure of Case 1 was converted from oliguric to nonoliguric by the administration of furosemide. However, despite a urine volume of greater than 1000 ml/day, the blood urea nitrogen and serum creatinine rapidly rose, requiring additional dialyses.

Case 2 developed circumoral and acral paresthesias as the only neurotoxic symptoms. These disappeared 48 to 72 hours after the colistin was stopped. Both patients recovered completely from the neurotoxicity, but creatinine clearances eight and 36 months later were borderline low.

Discussion

Colistin is excreted by the kidneys and the incidence of nephrotoxicity is high. Koch-Weser, et al., detected development of renal insufficiency in 20% of 317 courses of colistin therapy.⁴ Acute tubular necrosis occurred in another 1.9%. Some reports suggest that nephrotoxicity is dose related and occurs only when colistin is given in excessive amounts or to persons with pre-existing renal disease.^{10,11} Case 2, who received 2 to 4 mg/kg/day, and some of the cases of Koch-Weser, et al.,⁴ indicate that therapeutically recommended amounts given to persons without antecedent renal disease also can produce acute renal failure.

Evidence of nephrotoxicity usually occurs during the first two to four days of therapy and may continue to progress after the colistin has been discontinued.⁴ Microscopically the kidneys may show no recognizable pathology¹² or may show evidence of acute tubular injury, including necrosis.^{6,7,11,13} If the patient survives the period of acute oliguric renal failure subsequent recovery may be complete¹³ or marginal (Cases 1 and 2).

Neurotoxicity has been reported to occur in over 7% of patients treated with colistin, with respiratory insufficiency or apnea in 2%.⁴ Apnea may not be preceded by lesser neurotoxic symptoms such as paresthesias.

Aminoglycoside antibiotics such as neomycin, streptomycin and kanamycin as well as the polymyxins are capable of producing an acute neuromuscular blockade.^{3,14} The clinical syndrome produced resembles myasthenia gravis with apnea

being due to respiratory muscle paralysis and not due to central nervous system toxicity. Although such reactions have occurred in patients with known myasthenia gravis,^{14,15} most affected persons do not have this disorder. The polymyxins have a greater propensity to produce a neuromuscular blockade than do other antibiotics.

The mechanism of the neuromuscular blockade is not the same for all antibiotics. For example, studies in rats suggest that at the myoneural endplate neomycin interferes with acetylcholine release from the nerve ending and reduces sensitivity of the postjunctional membrane to acetylcholine.^{14,16} The latter effect resembles that induced by curare. Colistin and polymixin B appear to have a presynaptic effect only, probably interfering with the release of acetylcholine.^{14,16}

It is tempting to relate the action of colistin on the nerve cell to its action on bacteria. The polymyxins are thought to produce their antibacterial effect by acting as cationic detergents that bind to anionic sites on the lipid-rich bacterial cell membrane, thereby disrupting it.^{17,18} They may attack lipid-rich neurons similarly.

Relatively small amounts of the polymyxins can produce the neuromuscular blockade. Lindesmith, et al.,³ described a patient who developed apnea less than two hours after receiving a single 50 mg injection of polymixin B. Muscle weakness without apnea has been reported to occur with a blood concentration of colistin as low as 2 mcg/ml.⁵ The desired therapeutic level is probably in the range of 5 to 8 mcg/ml.^{5,12,19} Koch-Weser et al. found that 83% of neurotoxic reactions occurred before a total of 1 g colistin was given.⁴

Management of the neuromuscular blockade consists of discontinuing the colistin and supporting respiration. Administration of neostigmine or edrophonium (Tensilon^R) with perhaps rare exceptions⁵ is of no benefit.³ Although the mechanism is uncertain, intravenous calcium has seemed beneficial in occasional cases.³ The calcium may act by enhancing the release of acetylcholine.¹⁴ As the colistin is eliminated from the body, recovery from the neuromuscular blockade is complete.³ Dialysis would seem indicated only when acute renal failure markedly impairs the ability of the patient to excrete the drug.

Colistin is not easily removed by dialysis. Neither Goodwin and Friedman¹⁹ nor MacKay and Kaye²⁰ could demonstrate removal by hemodialysis using the Kolff twin coil dialyzer which has a

urea clearance of approximately 120 ml/min at a blood flow of 200 ml/min.²¹ Likewise Goodwin and Friedman could not lower the serum concentration of colistin using a modified two-layer Kiil dialyzer. Gombos, et al.,²² using the same Kiil dialyzer (urea clearance 82 ml/min, creatinine clearance 62 ml/min at a blood flow of 200 ml/min) claim to have demonstrated removal of colistin. Dialyzed patients had a decrease in serum colistin concentration of from 57 to 66% as compared to 33 to 57% for controls. However, the dialyzed patients were followed for 10 hours and the controls only six to eight hours. Recalculating their results at the six-hour period reveals an average decrease of 51% (seven patients, range 40 to 61%) for the dialyzed patients, compared to an average decrease of 40% (three patients, range 27 to 57%) without dialysis. The difference is not very impressive.

Curtis and Eastwood,²³ also using the Kiil dialyzer with a single-pass dialysate flow, demonstrated that the serum colistin concentration fell an average of 1.16 mcg/ml/hr during dialysis of three patients as compared to a decrease of 0.36 mcg/ml/hr without dialysis. Although the rate of fall in Case 1 during dialysis was less than that obtained by Curtis and Eastwood,²³ perhaps due to greater tissue and protein binding as a result of the long period between administration

and dialysis, the highly efficient hemodialysis system used resulted in a decrease that was greater during dialysis than after.

There is some evidence that colistin can be removed by peritoneal dialysis, but the amount is small.^{19,24}

Summary

Two patients who developed neurotoxic and nephrotoxic reactions from colistin are described. Neither had previous evidence of renal disease. One patient developed acute renal failure and a neuromuscular blockade that resulted in quadriplegia, apnea and cardiac arrest after receiving an excessive amount of the drug (20 mg/kg/day). The other developed paresthesias and acute renal failure following an appropriate dose of colistin (2 to 4 mg/kg/day for four days). Both patients required hemodialysis but subsequently recovered completely except for a marginal impairment of renal function as measured by the creatinine clearance.

The results of serum assays suggest that by using two Cordis-Dow hollow fiber dialyzers arranged in series with a single-pass dialysate delivery system colistin was removed by hemodialysis from the patient who received the larger amount.

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A Pedunculated Cyst of the Heart

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CARDIAC EPITHELIAL cysts of endodermal origin are uncommon in the world literature. This report presents a posterior left ventricular cyst of probable endodermal origin.

Case Report

A 19-year-old-Caucasian male was involved in a single car accident, sustaining severe closed-head trauma. He expired, six hours after the accident, of cerebral edema and uncal herniation. Past history was unremarkable though there was an alleged history of drug abuse.

At autopsy, in addition to diffuse cerebral injuries and several fractured ribs, there was a spherical 7 mm cyst fixed to the posterior lateral ventricular wall adjacent to the chordae tendineae of the posterior papillary muscle and arising between trabeculae carneae (see Figure 1). This cyst was yellow-white in color, relatively soft, and of an apparent homogenous consistency. It was pedunculated with a one mm stalk that was composed of myocardial tissue.

Microscopically the outer surface of the cyst was composed of cells that were continuous with those of

the endocardium. There was a second layer of underlying cells and these were ciliated, columnar and closely resembled cells lining the respiratory passages. The cyst was filled with an amorphous, acellular eosinophilic coagulum (see Figure 2). Elastin, reticulum, P.A.S. and mucin stains were negative.

Comment

Epithelial cysts have been found in numerous locations within the heart, but there is only one other reported case of a pedunculated cyst.¹⁰ In the other instances of epithelial cysts, the lesion rarely projected above the endocardial surface.

Generally, the cysts fall into two patterns, ciliated and non-ciliated, with the former found more commonly in the left ventricle and the latter in the right atrium.⁶ Although the cysts have all been reported as incidental findings, they potentially could serve as a nidus for thrombus formation, cause conduction defects or, if the stalk ruptured, cause a lethal embolus. Table 1 summarizes the epithelial cysts of the heart which have

From the Pathology Department of Hennepin County General Hospital.



Fig. 1—Arrow indicates pedunculated cyst in the left ventricle.

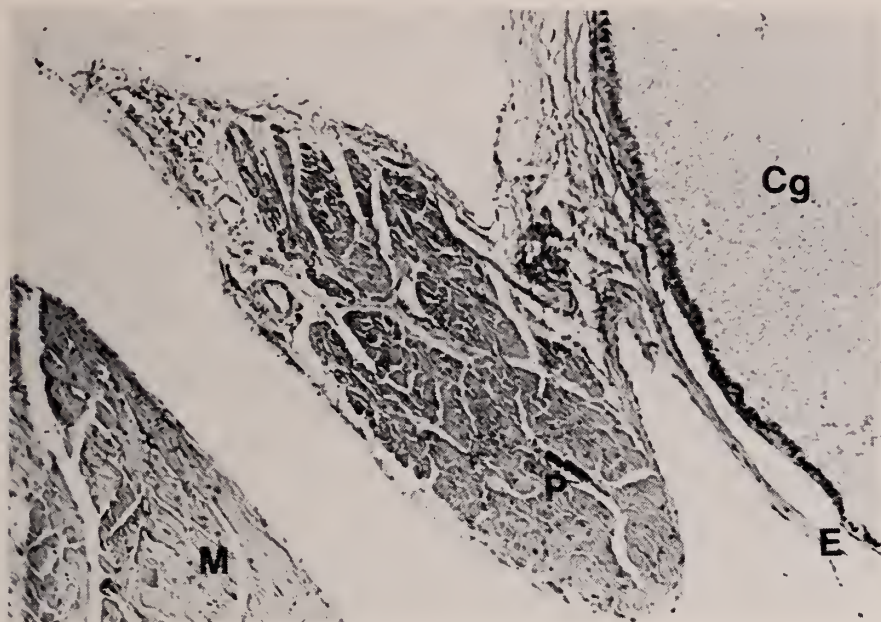


Fig. 2—Section of pedunculated cyst, 4x.

M: Myocardium
P: Pedicle composed of myofibrils
E: Endocardial cells composing outer layer of cyst
C: Ciliated columnar cells forming inner cyst wall
Cg: Coagulum within cyst

TABLE 1
Reported Cases of Epithelial Cysts of the Heart

Ref. #	Reference	Age	Sex	Cause of Death	Size in mms.	Location	Lining Epithelium
17	Stoeckenius	45	M	Pneumonia & Ca of stomach	4 mm. in diameter	Left vent., posterior papillary muscle	One to two layers, flat to columnar, ciliated
7	Kolatschow	45	M	Echynococcosis	21 x 18 x 17	Ant. left ventricle near papillary muscle	Columnar, ciliated
4	de Chatel	Newborn	F	Meningo-encephalocele	Lentil size	Interatrial septum above tricuspid	Squamous and columnar
14	Rezek	71	F	Ca of stomach subdural	Multiple, small	Interatrial septum, bulging into right atrium	One to two layers, right columnar to cuboidal
3	Davidsohn	64	F	Ca of cecum and peritonitis	10 x 4 x 5	Left ventricle, post. papillary muscle	One to two layers, ciliated
1	Bayer	51	F	Ca of colon	Cherry-sized	Left ventricle, post. near A.V. sulcus	One layer, ciliated
18	Yamauti	38	M	Miliary T.B.	5.5 x 5 x 6	Left ventricle within wall	One layer, cuboidal, ciliated
15	Sachs	44	M	Myocardial infarct	9 mm. diam.	Left ventricular lat. wall below A.V. sulcus	Columnar and cuboidal, ciliated
13	Rabson	29	F	? RHD and Stokes Adams Syndrome	Microscopic	Posterior wall, left atrium and A.V. sulcus	Cuboidal
9	Leighton	58	F	Cerebral embolus	16 x 10 x 9	Left ventricular lat. wall below A.V. sulcus	Columnar, ciliated
2	Brandt	6 mo.	F	Pneumonia, cong. heart disease	2.5 x 2 x 1.5	Interatrial septum	Stratified squamous
5	Epstein	73	F	Mitral insufficiency	Cherry-sized	Left ventricle, posterior wall	—
10	Marshall	30	M	Multiple brain tumors	5 x 4 x 4	Left ventricle, post. wall pedunculated	Pseudostratified ciliated, one layer columnar, ciliated
11	Morris	86	F	Cerebral ischemia Cardiac cond. defect	20 x 10 x 10	A-V septum	—
	Hastings	19	M	Closed head trauma	7 mm. in diameter	Left ventricle, post. wall pedunculated	Two layers, flat cuboidal, inner layer columnar, ciliated

been reported.

Several theories have been advanced to describe the origin and occurrence of these lesions: (1) Anomalous differentiation of cardiac mesoderm, (2) Origin in dermoid cysts, (3) Epicardial malformations, (4) Displacement of postbranchial body tissue, and (5) Sequestration of respiratory epithelium.¹⁰

The sequestration of respiratory epithelium seems best able to explain the formation of cysts similar to that reported here. The cardiovascular system and respiratory system are both formed at approximately the same embryological time. The

primordium of the respiratory system arises from the ventral surface of the foregut at about 21 days. Immediately ventral to these structures, the primitive endocardial heart tubes fuse, forming a single endocardial tube.⁸ It is entirely possible that entrapment of primitive respiratory epithelium may occur within the developing myocardium at this stage. The pedunculation of the cyst described here is unusual but could occur if the structure lay within the myocardium at one stage of its development and then was extruded to the surface as the left ventricle continued to develop.

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"Are you a doctor?" He turned his fierce dark eyes upon me as he asked this last question.

"Yes, I am," I answered.

"Then put your hand here," he said, with a smile, motioning with his manacled wrists towards his chest.

I did so; and became at once conscious of an extraordinary throbbing and commotion which was going on inside. The walls of his chest seemed to thrill and quiver as a frail building would do inside when some powerful engine was at work. In the silence of the room I could hear a dull humming and buzzing noise which proceeded from the same source.

"Why," I cried, "you have an aortic aneurism!"*

*Arthur Conan Doyle's A Study in Scarlet, Chapter VI.

A man's pictures and books are generally pretty correct copies of the intellectual and moral qualities of the mind.—Autobiography, "Travels Through Life," Ch. III

WHEREVER IT HURTS

HERE

Fractures



Wherever it hurts,
Empirin Compound with
Codeine usually provides
the relief needed.

HERE


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Indications: Lomotil is effective as adjunctive therapy in the management of diarrhea.

Contraindications: In children less than 2 years, due to the decreased safety margin in younger age groups, and in patients who are jaundiced or hypersensitive to diphenoxylate HCl or atropine.

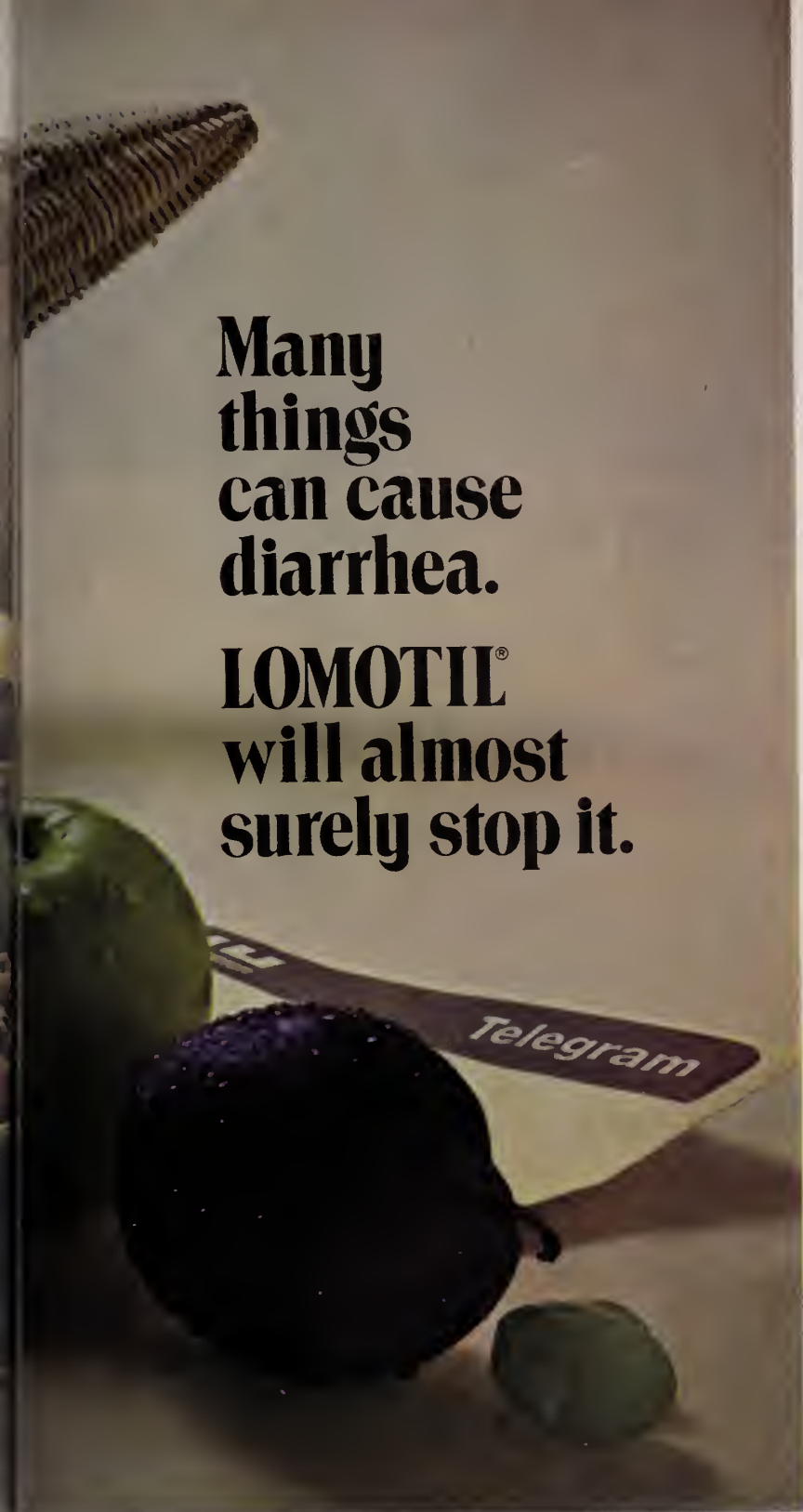
Warnings: Use with caution in young children, because of variable response, and with extreme caution in patients with cirrhosis and other advanced hepatic disease or abnormal liver function tests, because of possible hepatic coma. Diphenoxylate HCl may potentiate the action of barbiturates, tranquilizers and alcohol. In theory, the concurrent use with monoamine oxidase inhibitors could precipitate hypertensive crisis.

Usage in pregnancy: Weigh the potential benefits against possible risks before using during pregnancy, lactation or in women of childbearing age. Diphenoxylate HCl and atropine are secreted in the

breast milk of nursing mothers.

Precautions: Addiction (dependency) to diphenoxylate HCl is theoretically possible at high dosage. Do not exceed recommended dosages. Administer with caution to patients receiving addicting drugs or known to be addiction prone or having a history of drug abuse. The subtherapeutic amount of atropine is added to discourage deliberate overdosage; strictly observe contraindications, warnings and precautions for atropine; use with caution in children since signs of atropinism may occur even with the recommended dosage.

Adverse reactions: Atropine effects include dryness of skin and mucous membranes, flushing and urinary retention. Other side effects with Lomotil include nausea, sedation, vomiting, swelling of the gums, abdominal discomfort, respiratory depression, numbness of the extremities, headache, dizziness, depression, malaise, drowsiness, coma, lethargy.



**Many
things
can cause
diarrhea.**

**LOMOTIL®
will almost
surely stop it.**

The causes of diarrhea are as varied as man's complaints and indiscretions. Because the causes of diarrhea can be obscure and because uncontrolled diarrhea can present serious problems, it is important to know a drug that will usually stop diarrhea promptly. For many physicians, the antidiarrheal drug of choice is Lomotil. It provides almost certain control of diarrhea.

It is also useful in controlling the intestinal transit time of patients with ileostomies and colostomies and the diarrhea occurring after gastric surgery.

Serious side effects are infrequent with Lomotil. It should be used with caution in young children, however, because of their variability in response. Use of Lomotil in children under two years of age is contraindicated.

**For the almost certain
control of diarrhea,**

LOMOTIL®

TABLETS/LIQUID

Each tablet and each 5 ml. of liquid contain:
Diphenoxylate hydrochloride 2.5 mg.
(Warning: may be habit forming)
Atropine sulfate 0.025 mg.

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nausea, restlessness, euphoria, pruritus, angioneurotic edema, giant urticaria and paralytic ileus.

Dosage and administration: *Lomotil is contraindicated in children less than 2 years old.* Use only liquid for children 2 to 12 years old. For 2 to 5 years, 4 ml. (2 mg.) t.i.d.; 5 to 8 years, 2 mg. q.i.d.; 8 to 12 years, 4 ml. (2 mg.) 5 mg. daily; adults, two tablets (5 mg.) t.i.d. to two tablets (5 mg.) q.i.d. or two regular teaspoonfuls (10 mg.) q.i.d. Maintenance dosage may be as low as one fourth of the initial dosage. Make downward dosage adjustment as soon as initial symptoms are controlled.

Dosage: Keep the medication out of the reach of children since accidental overdose may cause drowsiness, even fatal, respiratory depression. Signs of overdose include flushing, lethargy or coma, hyporeflexes, nystagmus, pinpoint pupils, tachycardia and respiratory depression which may occur

12 to 30 hours after overdose. Evacuate stomach by lavage, establish a patent airway and, when necessary, assist respiration mechanically. Use a narcotic antagonist in severe respiratory depression. Observation should extend over at least 48 hours.

Dosage forms: *Tablets*, 2.5 mg. of diphenoxylate HCl with 0.025 mg. of atropine sulfate. *Liquid*, 2.5 mg. of diphenoxylate HCl and 0.025 mg. of atropine sulfate per 5 ml. A plastic dropper calibrated in increments of ½ ml. (total capacity, 2 ml.) accompanies each 2-oz. bottle of Lomotil liquid.

Dosage forms: *Tablets*, 2.5 mg. of diphenoxylate HCl with 0.025 mg. of atropine sulfate. *Liquid*, 2.5 mg. of diphenoxylate HCl and 0.025 mg. of atropine sulfate per 5 ml. A plastic dropper calibrated in increments of ½ ml. (total capacity, 2 ml.) accompanies each 2-oz. bottle of Lomotil liquid.



MINOCIN® made the difference in just eight days.*

Clinical Data:

Patient: 47-year-old male.

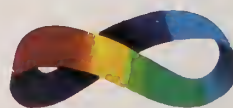
Diagnosis: Severe pyoderma, left hand.

Culture: *Staphylococcus aureus*, coagulase positive and sensitive to MINOCIN.

Temperature: 102° F

Therapy: MINOCIN Minocycline HCl Capsules, 100 mg: 200 mg *stat*, 100 mg every 12 hours. Medication began 9/7/71. By fourth day, temperature was normal and pustular lesions considerably improved. Last dose taken 9/14/71.

Concomitant therapy: None.†



Semisynthetic

MINOCIN®
MINOCYCLINE HCl

Capsules, 100 mg: 2 *stat*, 1 q 12 h.

Minocycline is a tetracycline with activity against a wide range of gram-negative and gram-positive organisms.

Contraindications: Hypersensitivity to any tetracycline.

Warnings: The use of tetracyclines during tooth development (last half of pregnancy, infancy and childhood to the age of 8 years) may cause permanent discoloration of the teeth (yellow-gray-brown). This is more common during long-term use but has been observed following repeated short-term courses. Enamel hypoplasia has also been reported. Tetracyclines, therefore, should not be used in this age group unless other drugs are not likely to be effective or are contraindicated. In renal impairment, usual doses may lead to excessive accumulation and liver toxicity. Under such conditions, use lower doses, and, in prolonged therapy, determine serum levels. Photosensitivity manifested by an exaggerated sunburn reaction has been observed in some individuals taking tetracyclines. Advise patients apt to be exposed to direct sunlight or ultraviolet light that such reaction can occur, and discontinue treatment at first evidence of skin erythema. Studies to date indicate that photosensitivity does not occur with MINOCIN Minocycline HCl. In patients with significantly impaired renal function, the antianabolic action of tetracycline may cause an increase in BUN, leading to azotemia, hyperphosphatemia, and acidosis. Pregnancy: In animal studies, tetracyclines cross the placenta, are found in fetal tissues, and can have toxic effects on the developing fetus (often related to retardation of skeletal development). Embryotoxicity has been noted in animals treated early in pregnancy. Safety of use during human pregnancy has not been established. **Newborns, infants and children:** All tetracyclines form a stable calcium complex in any bone-forming tissue. Prematures, given oral doses of 25 mg./kg. every 6 hours, demonstrated a decrease in fibula growth rate, reversible when drug was discontinued. Tetracyclines are present in the milk of lactating women who are taking a drug of this class. Safe

use has not been established in children under 13.

Precautions: Use may result in overgrowth of nonsusceptible organisms, including fungi. If superinfection occurs, institute appropriate therapy. In venereal diseases when coexistent syphilis is suspected, darkfield examination should be done before treatment is started and blood serology repeated monthly for at least four months. Patients on anticoagulant therapy may require downward adjustment of such dosage. Test for organ system dysfunction (e.g., renal, hepatic and hemopoietic) in long-term use. Treat all Group A beta hemolytic streptococcal infections for at least 10 days. Avoid giving tetracycline in conjunction with penicillin.

Adverse Reactions: (Common to all tetracyclines, including MINOCIN) GI: (with both oral and parenteral use): anorexia, nausea, light-headedness, vomiting, diarrhea, glossitis, dysphagia, enterocolitis, inflammatory lesions (with monilial overgrowth) in anogenital region. **Skin:** maculopapular and erythematous rashes. Exfoliative dermatitis (uncommon). Photosensitivity is discussed above ("Warnings"). **Renal toxicity:** rise in BUN, dose-related (see "Warnings"). **Hypersensitivity reactions:** urticaria, angioneurotic edema, anaphylaxis, anaphylactoid purpura, pericarditis, exacerbation of systemic lupus erythematosus. When given in high doses, tetracyclines may produce brown-black microscopic discoloration of thyroid glands; no abnormalities of thyroid function studies are known to occur. In young infants, bulging fontanels have been reported following full therapeutic dosage, disappearing rapidly when drug was discontinued. **Blood:** hemolytic anemia, thrombocytopenia, neutropenia, eosinophilia.

NOTE: Concomitant therapy: Antacids containing aluminum, calcium, or magnesium impair absorption; do not give to patients taking oral minocycline. Studies to date indicate that MINOCIN is not notably influenced by foods and dairy products.

*Indicated in infections due to susceptible organisms. Culture and sensitivity testing recommended. Tetracyclines are not the drugs of choice in the treatment of any staphylococcal infection.

†Case Report, Clinical Investigation Department, Lederle Laboratories.



LEDERLE LABORATORIES, A Division of American Cyanamid Company, Pearl River, New York 10965

436-2



Editorials

Liticogenic Disease

TO LISTEN TO COURT testimony regarding an accident, the average indiscriminating person might well conclude that nearly any disease or disability can potentially result from an accident. Plaintiffs' attorneys have astutely garnered from their clients' experiences an exhaustive list of ailments and complaints from A to Zed—as possible, if not probable, sequels of an accident.

"After all, there is nothing to lose!" Why not incriminate an accident for that headache, that crick in the neck, that twinge in the back, that you-name-it, that mysteriously appears sometime *after* an accident in the victim who was "never subject to previous headaches, cricks, or twinges!"

Unfortunately, qualified and expert testimony has established that a remote three-to-four-year-old non-organic strain, without bruise, fracture, laceration or muscle rupture, has caused obvious disease or contributed to pre-existing disease.

The *post hoc ergo propter hoc* fallacy dies a hard death; it has persistently plagued logicians down the centuries and is still accepted by the untutored and exploited by the unscrupulous. Consecutiveness *per se* does not imply causality and should never constitute a basis for sound medical doctrine.

Neither incidents nor accidents cause disease. If an injury has been sustained, the victim will suffer the effects of that injury immediately. Any accident which does not cause immediate physical distress is indeed minor and represents nothing more serious than a non-organic strain, or contusion, comparable to what any athlete might experience after strenuous activity. Such discom-

fort is physiologic, not organic. Even if the injury is severe enough to cause organic damage (a fracture, muscle rupture, ligament tear, skin laceration), these injuries heal in a more or less scheduled period of time. When healing is complete most of the sequelae of that injury are terminated. The chapter on that incident is closed.

Calling to mind other ailments, symptoms, aches and pains, which may continue for months or even years after the usual healing period for the specific injury has passed, occasionally becomes the occupation of a plaintiff's attorney who endeavors to relate it to the litigious incident. To indulge in this type of machination merely delays the search for a medical cause of ailments, which may be obvious from physical findings, laboratory, or x-ray studies. The patient and his attorney, instead, proclaim the incident as the etiologic factor and with that another case of "liticogenic disease" has been born.

Litigation disease has its own syndrome: the etiology relates to an incident of libelous injury; subjective complaints are referrable to almost any extant set of symptoms; physical, laboratory and x-ray findings are irrelevant and immaterial, though very often they do disclose the correct diagnosis, which is then given the "post hoc, ergo propter hoc" causality; therapy consists of an almost endless series of non-beneficial treatments and the prognosis is contingent upon the outcome of the pending lawsuit.

"Liticogenic disease" is not catalogued in medical annals. But it does exist.

Carl O. Rice, M.D., Ph.D.
Editor Emeritus

Dr. Lafayette Houghton Bunnell of Winona County

THE PAPER by Dr. Harnagel* of this issue of MINNESOTA MEDICINE, calls attention to an historically interesting Minnesotan, Dr. Lafayette Houghton Bunnell, whose association with the discovery of the Yosemite Valley of California is interestingly presented. Bunnell's medical activities included military service in 1846 and 1851 and he evidently served again during the Civil War after receiving a medical degree (honorary) from the LaCrosse Medical College. The author states that Bunnell settled in Homer, a few miles south of Winona, "after the Civil War" and "that he practiced medicine" (sic). Dr. Lafayette Bunnell and his father, Dr. Bradley Bunnell, are mentioned in "History of Medicine in Winona County" published in MINNESOTA MEDICINE in 1940.¹ Comments there confirm Bunnell's visit to the LaCrosse area prior to the War, but also notes

that his residence in the Homer area was first recorded in 1871, and that "there is no indication of his having practiced his profession while in Winona County." Dr. Bradley Bunnell practiced in Homer from the early 1850's to his death in 1857, a period when deaths in the area resulted from such diseases as malaria, cholera, typhoid fever and scarlet fever. The socio-economic status of medical practice is illustrated by the 1855 activities of another Homer physician, who was listed as a physician and surgeon, justice of the peace, surveyor and coroner. The story of Lafayette Bunnell's varied activities and especially his explorations well deserve the attention of Minnesota physicians and we should be thankful that Dr. Harnagel submitted his paper to MINNESOTA MEDICINE.

Francis W. Lynch, M.D.
St. Paul, Minnesota

*See page 73.

Reference

1. This History was presented in several parts, in separate numbers of Minnesota Medicine, beginning in April, 1940 (p. 252). The information about the Drs. Bunnell is found on page 247 in the June, 1940, issue. The name of the author is not indicated.

Bilateral Hip Arthroplasty after Renal Transplantation

THE ARTICLE BY Woods,* et al., in the December issue of this Journal, outlines a successful result in the total rehabilitation of a patient with end stage renal disease and bilateral aseptic necrosis of the hip. Major advances in the areas of transplantation immunology as well as surgical techniques have lifted organ transplantation beyond an experimental exercise to a clinically practical and useful procedure. The best results continue to be in those patients who have received an organ from a living related donor. The rehabilitation in this group is shorter, post-transplant renal function is usually immediate, and fewer rejection episodes occur. Small doses of immunosuppressive drugs are therefore required. On the other hand, the number of patients receiving kidneys from cadaver donors is steadily increasing. In this group of patients the complications from

recurrent rejection and immunosuppressive therapy are significantly greater. These problems have been recently outlined by Najarian and Simmons,¹ and include infection, an increased incidence of malignancy, Cushing's disease, gastrointestinal hemorrhage, cataracts, thromboembolic disease, hypertension, and alteration in calcium metabolism. One of the most disturbing barriers to the successful rehabilitation of transplant patients is avascular necrosis of the femoral heads, femoral condyles, and to a lesser degree other bones. The etiology is unknown, but appears definitely related to high doses of steroids. As the dosage of steroids necessary to sustain immunosuppression have been decreased, most transplant centers around the country have noticed a similar decrease in the incidence of avascular necrosis. The problem, however, remains, and the treatment for the most part has been symp-

*See page 1103, December, 1972 issue.

tomatic. Treatment by prolonged periods of non-weight bearing with crutch support would appear at best questionable, for it is doubtful that the bony lesions can revascularize sufficiently to restore normal architecture in the presence of maintenance steroids.

If the patients' symptoms are unrelieved by conservative management and the joint architecture has been severely altered, total joint replacement arthroplasty may be indicated. However, this recommendation must be tempered by the understanding that the risk of surgery in this group of patients is clearly greater than the general population and the complication of wound infection

alone could well lead to deterioration of renal function and allograft rejection.

The authors are to be complimented on the excellent results they obtained in this particular case. Certainly we would agree completely that patient motivation is an important factor in the rehabilitation of these patients. Hopefully in the future, the immunological barriers to successful organ transplantation can be overcome and immunosuppressive drugs therefore deleted altogether. In the meantime, we can safely say that problems relating to musculo-skeletal disease following renal transplantation will continue to be with us.

David S. Bradford, M.D.
Minneapolis, Minnesota

Reference

1. Najarian John S and Simmons Richard L. Transplantation. Lea & Febiger, Philadelphia, Section 11, page 445, 1972.

Concurrence of Achalasia with Adenocarcinoma of the Stomach

SHAFFER AND JACOBSON* particularly emphasize early detection of malignancy in patients with achalasia by regular, periodic examinations. Yet there exist several good reasons why recognition of malignancy may go unnoted for some time.

Their case report again reveals how difficult it is to detect early malignancy in a patient with previous diagnosis of achalasia. Inasmuch as the incidence may be even greater than three percent, as stated by the authors and others, this does raise serious question as to how often patients

with achalasia should be thoroughly studied, and also to what extent. Obviously, treatment by the Heller procedure is indicated early as a prophylactic measure as well as for the relief of symptoms. Unfortunately, x-ray studies can only be relied upon with limited success, and endoscopy with biopsy, which may be more accurate, is technically more uncomfortable and difficult. I am not even convinced that the results of cytological studies by the brush technique are worth their routine use.

Vincent L. Fromke, M.D.
Minneapolis, Minnesota

*Shaffer, Rex B. and Jacobson, John R.: Concurrence of Achalasia with Adenocarcinoma of the Stomach. 55:1033, 1972.

Actinomycosis of the Female Genital Organs

RICHTER ET AL.* have presented an excellent review of one of the rarer clinical manifestations of actinomycosis. Actinomycosis, now considered by some authorities to be a bacterial infection, is felt to be decreasing in incidence. There is no way to substantiate this clinical impression. There are no reliable skin tests nor is the disease reportable. This decrease may be due to the introduction of antibiotics, especially penicillin. However, earlier diagnosis as well as more effective therapy may also have reduced reportable cases. Actinomyces israelii, which is responsible for most human infection, is an anaerobe which has never been demonstrated in soil, plants or other fomites

outside the body. Therefore, the theory of endogenous implantation is generally held to be most likely. From its original site, spread may occur by direct extension along sinus tracts and by metastases.

Penicillin is the drug of choice in this condition. Prior to its introduction, the prognosis in actinomycosis was grave. Antibiotics have changed this dramatically. Whenever possible the combined approach of both surgery and antibiotics is desirable. It should be further emphasized that antibiotic therapy must be administered in adequate dosage ranges and for a sufficient period of time.

Willard C. Peterson, M.D.
Minneapolis, Minnesota

*Richter GO et al.: Actinomycosis of female genital organs. Minn Med 55:1003, 1972.

In-Hospital Postpartum Approach to Family Planning

DESPITE THE RECENT well-publicized decrease in birth rates in Minnesota and the United States, there is evidence that many of these births are "unwanted." In some areas where abortion on request is available, as in New York, nearly 300 pregnancy terminations are carried out for the resident population for every 1,000 live births. Because of our current restrictive abortion law, comparable figures are not available for Minnesota. However, the National Center for Disease Control estimates that 1,500 to 2,000 Minnesota residents now seek abortion elsewhere each year, and approximately 5,000 illegitimate births occur annually in the state. These data suggest that a substantial number of unwanted pregnancies occur. While there is evidence that many patients who have a negative reaction to their pregnancy during its early stages develop a positive acceptance of it later, the evidence, nevertheless, clearly suggests that there is a continuing need for effective birth control programs in our state.

An effective program requires that potential acceptors of a birth control method be reached, taught, prescribed for, and followed. Postpartum and Gyn wards contain a concentration of known fertile women who are available for group teaching, and who are at this time generally highly motivated towards accepting a birth control method. In-hospital family planning programs which concentrate on postpartum and postabortal patients are for these reasons effective and efficient.

A program of this type has been operative at Hennepin County General Hospital for five years. All patients are invited to attend a group discussion of family planning methods, which is led by a nurse who has been specially trained for this purpose. All methods are described together with a discussion of some basic physiology, and a short movie is shown. Patients are invited to ask questions, and following this, they are visited at the bedside where further discussion can be carried out in private with the nurse. At this time, the patient indicates whether she is interested in birth control or not, and if so, what her choice of method is. The nurse conveys this information to the physician who prescribes for the patient whatever he considers appropriate. Patients are free to make their own choice with the physician,

and there is no pressure or coercion of any sort applied. More than 90% of the postpartum patients accept some method of contraception.

The results of early puerperal insertion of the intrauterine device are presented in a paper in this issue.* Although the "fall-out" rate has been high, the convenience, simplicity, and safety of this method make it an appealing one. Recent improvements in the design and performance of IUDs give promise of increasing the popularity of this technique. Over the past two-year period, 52% of the patients have been choosing the oral contraceptive. This ordinarily is started on the day of discharge, but the use of pills is modified for those who nurse. Our five-year experience with approximately 3,500 patients following this routine has documented to us the safety, effectiveness, and lack of significant side effects or problems with this approach. Currently, 11% of the patients are accepting permanent sterilization carried out by postpartum tubal ligation. The use of the rhythm method, foam, condoms, and diaphragms accounts for 6%, and the remaining patients have no need for or do not choose to use any form of contraceptive.

The patient follow-up portion of the program has shown that a very large increase in patient attendance at postpartum clinics has occurred. Patient acceptance and retention of information and advice is high when it is presented in a group teaching setting by an interested and highly qualified nurse. The sessions are unhurried, informal, and relaxed. The atmosphere is conducive to free discussion. The almost universally favorable patient reaction is probably aided by the fact that the discussion leader is female. The overworked physician, on the other hand, is likely to be preoccupied with other problems of seemingly greater momentum. In many cases, he does not initiate a discussion of birth control methods with his patient at all, and should the patient bring it up, it is likely to receive cursory attention.

The approach described saves time for the busy physician without in any way interfering with his prerogatives with regard to patient management. Family planning programs should be made a routine part of postpartum care in all hospitals.

Donald W. Freeman, M.D.
Minneapolis, Minnesota

*See page 49.

Letter to the Editor

The Technological Challenge

AS ONE STUDIES the events of the history of mankind, it becomes apparent that ordinary political events have occurred in an ever-changing, kaleidoscopic fashion: even in what we look back upon as relatively stable times, such as the Victorian Era. In contrast, cultural changes have occurred in great cycles, lasting, in many instances, for centuries. As an example of each, the entire history of the French Revolution and its aftermath: from 1789 to the fall of Napoleon, comprised a time span of about 25 years, whereas the Renaissance, even in Italy, lasted for the better part of three centuries. Somewhere around the beginning of the eighteenth century, a pronounced speedup in technological development began; the beginnings, we have learned to call the Industrial Revolution. That technical and scientific advances have continued at an ever faster pace since then is readily evident. What we may not as yet be prepared to accept is the possibility that this cultural revolution may, like others, at some time decelerate.

Technical advances are, for many reasons, not consistently favorable to the welfare of humans exposed to them. The enslavement of people in the factory system early in the industrial revolution is a familiar story. Today, social unrest, pollution, and particularly, the establishment of mammoth industrial and political systems which stifle individuality and respond inadequately to human needs appear as indicators of what may be limits to the desirability of technical advance. In spite of computers and split atoms, it should not be hard to see that, today as always, man enters the world naked and defenseless, proceeds to maturity with a deluded sense of his personal significance, and then passes relentlessly into oblivion. During this journey from nothingness to nothingness, his basic drives, his fears, and his inner needs seem not significantly different from what they must have been at the dawn of history.

The role of the physician in society is traditionally closely related to man's emotional needs, and the role of the "Medicine man" in recent primitive societies parallels those found by archeologists in ancient civilizations. It should be obvious that he has been looked to for something more than the application of technical knowledge, and it is for this reason that the relationship between the modern technological revolution and the medical pro-

fession holds even greater significance than is the case in other lines of human endeavor. In a short span of time, the rapid accumulation of scientific medical information has had a drastic effect upon relationships between the physician and the public.

There can be no question but that the medical discoveries of the past century comprise one of the greatest blessings ever bestowed upon the human animal. However, certain ancillary effects have had their ambivalent aspects. One noteworthy result is that, whereas formerly, the doctor measured his success by what the lay community thought of him, today he increasingly regards himself in terms of his image in the eyes of his colleagues. That such a development is predominantly fortuitous is undeniable; whereas the public could, and has, gullibly worshipped physicians whose performance was less than competent, peer acceptance is, to a far greater degree, based on reality. On the debit side, however, is the fact that the profession has assumed a near exclusive emphasis on technical skill and knowledge, and has difficulty in judging the humanitarian aspects of medical practice.

In recent years, in this country and elsewhere, the great bureaucratic institutions of today: political and private, have entered into the medical picture. Themselves the product of the technological age, and thereby blinded by the excesses of its changes, these institutions have proposed changes in the medical world which stress increased organization of both doctor and patient. Where results are in evidence, they exhibit a lack of concern for human values: in some cases, for both those of the provider and of the recipient of medical care.

Strangely, the United States, which leads the world in so many aspects of technology, has lagged behind other countries in technically organizing its medical care. It seems possible that the country's traditional linkage with a not-so-remote frontier society, with its intimate personal relationships, may have something to do with this. In Great Britain, a paradoxical system has been developed, under which, a sizeable segment of the profession has been virtually stripped of all its tools. The remaining part, removed from the personal lives of the patients, has exclusive use of the machines, which are glorified via a rigid mechanism of lengthy initiation and qualification

to its privileged ranks. The hierarchy inflicts many casualties upon those seeking to qualify for the use of the technical, and the victims are, in essence, left with no place to turn. The result is a mass exodus of professionals to 'lagging' nations, such as the United States, where the medical scene still offers them an opportunity to be useful.

In Russia, personal physician relationships have been relegated to poorly trained and compensated, individuals, who, while called physicians, are, in essence, paramedical personnel. This medical scapegoat must be at the beck and call of all. However, the limited skill that is deliverable can hardly lead to prompt access to good medical care.

In the United States, the medical profession has not, as yet, become engulfed into the massive, technically-oriented bureaucracy. Nevertheless, technical progress has had its effects. The ranks of primary physicians have been steadily shrinking in proportion to the population. Medical educational institutions have failed to keep up with demand, partly because the cost of technical teaching has increased, and partly because preoccupation with the technical has resulted in a dearth of attention to socio-economic matters. Medical costs have skyrocketed because the machines have been so expensive. In spite of this, it seems noteworthy that the world's most technically-advanced nation has afforded itself the time to adjust to the times in a more far-sighted, complete manner than its neighboring countries. In spite of drastic differences of opinion, virtually no segment of American society proposes a European solution to the problems of medicine.

Today, then, American doctors find themselves

challenged by what may be the greatest opportunity ever afforded a profession anywhere. It comprises placing technology where it belongs in the medical scene: in a position which places humanity and its needs first, with the machine secondary to it. While everyone agrees in principle with such a philosophy, the actual state of affairs is that many professionals are so obsessed with technical know-how and the pursuit of scientific facts that they regard these achievements as ends in themselves.

The time is overdue for the American medical profession to place studies of the needs and requirements of human beings in their proper perspective. Eminence in the profession must no longer be arrived at because of mastery of the technical alone, and recognition of accomplishments in the spheres of the application of medicine to people must be recognized achievements of at least the proportions of scientific discovery. Basic understanding of the needs of humanity must no longer be held as something too unsophisticated to merit the attention of those who would consider themselves professional leaders. The truly educated possessor of an M.D. degree must be possessed of an intelligent view of the forest, humanity, in addition to the trees of scientific fact, and until he does, he can hardly be expected to do other than distort the picture. If, however, he achieves this type of insight, he can be a significant factor in extending the life of our 300-year old cultural revolution: dealing with its excesses as a significant aspect of the pathology of our troubled civilization.

Henry B. Blumberg, M.D.
St. Paul, Minnesota

OLD DOC HESS SAYS: If you do not want your autographed picture to be relegated to the hidden file, frame it, attach the hanging hook, the nail to hang it on and the hammer to pound the nail; then to be certain, hang it yourself! . . . C.O.R.

No argument is needed to show what transforming power the mind can exert. The energy set free by the magic agencies of hope, courage, desperation, fanaticism, or by the enthusiasm for a great cause, may reveal the possession of a force undreamed of, or so husband the resources of the body as to keep the flame of life burning for a time when the oil seems exhausted.—James J. Putnam [1846-1918]

Obstetrics and Gynecology

Insertion of Intrauterine Devices

In the Early Postpartum Period

ROBERT A. DIAMOND, M.D. AND DONALD W. FREEMAN, M.D.

IN 1967, AN EVALUATION was made of the family planning done at Hennepin County General Hospital, and a program established to follow patients using oral contraceptives or intrauterine devices. This evaluation indicated that the percentage of patients who returned for postpartum examination was very low, suggesting that those who needed contraception most—those who received medical attention only for labor, delivery, and postpartum hospitalization, were not being served. To improve this situation it was decided to explore the idea of inserting intrauterine devices prior to discharge from the hospital.

A review of the literature showed early puerperal insertion to be safe but it was associated with a definite increase in the expulsion rate. In early 1966, the Population Council had organized and supported a large scale worldwide postpartum program in family planning. One of their early reports, along with one by London and Anderson^{2,6} from Los Angeles County General Hospital, showed considerably lower expulsion rates. Their reports gave us the enthusiasm to begin inserting intrauterine devices in the puerperium with the hope that the high percentage of our patients who never returned would then be provided some contraception.

Procedure

After delivery, all patients on the postpartum ward are visited by a family planning nurse who explains to them the different forms of contraception. Ninety percent of our delivered patients are discharged on some form of contraception. Over 50% of them choose oral contraceptives which are started on the day of discharge unless the patient is nursing. An intrauterine device is accepted by 20 to 25%, and the remainder are sterilized by tubal ligation or use other contraceptive methods.

If an intrauterine device is chosen, it is inserted on the day of discharge. The majority are discharged on either the fourth or fifth postpartum day. Routine postpartum discharge pelvic examination is done in the dorsal lithotomy position. A clean speculum is carefully inserted into the vagina and the cervix exposed. The speculum is then removed, and a bimanual examination done to assess the size, position, and consistency of the uterus. The speculum is reinserted and the anterior lip of the cervix grasped with a ring forceps. The device is then inserted as high into the uterine cavity as possible using the regular type inserter. The patient is re-examined after the speculum is removed to be sure that no part of the device is in the cervical canal. Patients are instructed to return for a checkup at six weeks' and three months' postpartum and at yearly intervals.

Results

The results are summarized in Table 1.

Between September 1, 1968 and December 31, 1970, a Lippes Loop D was inserted into 643 women on the day of discharge from the postpartum ward. Of this group 142 patients (22%) failed their postpartum appointments. Between

TABLE 1
Results of Early Puerperal
Intrauterine Device Insertions

	Lippes Loop D	Dalkon Shield
Number inserted	643	219
Patients lost to follow-up	142 (22%)	40 (19%)
Expulsions prior to six weeks	303 (60.5%)	86 (48%)
Expulsions six weeks to one year	43	—
Medical removals before one year	26 (4.8%)	5 (2.8%)
Menorrhagia		17
Dysmenorrhea		7
Infection		2
Pregnancies	6	1
Uterine Perforations	0	0

From the Department of Obstetrics and Gynecology, Hennepin County General Hospital and the University of Minnesota Medical School, Minneapolis, Minnesota.

Presented at a Meeting of The Minnesota Society of Obstetrics and Gynecology, April 29, 1972, Rochester, Minnesota.

May 1, 1971 and February 15, 1972, a Standard Size Dalkon Shield was inserted into 219 women on the day of discharge. There were 40 patients of this group (19%) who failed their postpartum appointments.

In the first six weeks after insertion, there were 303 expulsions of Lippes Loop D (60.5%) among those who returned for follow-up. There is no information about the 142 patients who failed their postpartum appointments, but even if all had retained the device, the expulsion rate would be 47% at six weeks. An additional 43 loops were expelled within one year of insertion for a total of 68% of those followed. Of those followed in the Dalkon series, there were 86 expulsions (48%) within the first six weeks. The follow-up for that group was too short for an evaluation at one year.

In the Lippes Loop series, there were no serious infections, but two devices were removed in association with a mild pelvic inflammatory disease. Seventeen patients had the device removed because of menorrhagia and seven due to dysmenorrhea. There were six pregnancies, all with the device in place. There were no known perforations. In the Dalkon group, five patients had the device removed for menorrhagia. There were no serious infections and no perforations. There was one pregnancy with the device in place.

Discussion

Early postpartum intrauterine device insertions are easy to perform and are painless. The availabilities and motivation of the patient at this time are other advantages. Furthermore, perforation is extremely rare and there appears to be no increased risk of infection or bleeding. The involution of the uterus is not affected.

The high expulsion rate, however, is a real problem. The results of several studies are summarized in Table 2.¹⁻⁶ Higher retention rates are reported when a special long inserter and devices with special long tails are used.^{1,6} However, the best results have been obtained with a new device called the Petal IUD. Rashbaum⁴ has reported 522 early postpartum insertions with this device, with 460 of these done on the delivery table. The expulsion rate was only 5.5%. Eight percent,

TABLE 2
Comparative Results of Early Puerperal
Intrauterine Device Insertions

Cooperative Statistical Program	Insertions		Expulsions	
	—		45.2%	
Phatak (India) 1965-1966 Lippes Loop D	903		37.8%	(at 3 months)
Population Council (Singapore) 1966-1968 Lippes Loop D with special long inserter	3168		18 %	(at 3 months)
London and Anderson (Los Angeles) 1966 Lippes Loop D (615 of 899)	899		20 %	
Population Council (Thailand) 1965-1969 Lippes Loop D with special long inserter	7172		19 %	(at one year)
Rashbaum (Beth Israel, New York) 1971 Petal IUD	522		5.5%	
Hennepin County General Hospital 1968-1972 Lippes Loop D	643		60.5%	(at 6 weeks)
Dalkon Shield	219		48 %	(at 6 weeks)

however, were removed for medical problems and about 7% for other reasons. There were also 11 pregnancies (2.1%) but no perforations.

Most spontaneous expulsions and indicated removals for pain and/or bleeding occur within the first three months. Reinsertion of a device three months postpartum can be carried out when necessary and little has been lost. Meanwhile, the remaining patients who have had early postpartum intrauterine device insertions have been afforded pregnancy protection, and for them, further measures may not be required. This is of particular value where patient follow-up is poor.

Summary

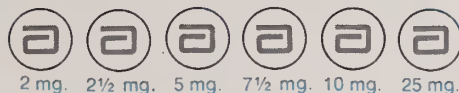
Despite the advantages of convenience, safety, and economy afforded by early puerperal insertion of intrauterine devices, the current high expulsion rate probably precludes acceptance of routine use of this technique. However, the reported better retention of a new device and the use of different inserters with the older device suggests that further studies may be worthwhile.

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Fracture Conference

Traumatic Spondylolisthesis

EDWARD D. HENDERSON, M.D., RAY E. SANTOS, M.D., RICHARD T. CHIROFF, M.D.
AND EINER W. JOHNSON, JR., M.D.

Dr. Richard T. Chiroff:

The patient was a 20-year-old white man who was involved in an automobile accident. He had been thrown from the vehicle in which he was riding and had been unconscious for a short but indefinite period. His initial emergency resuscitative care had consisted of intravenous fluids, whole blood, and immobilization of an injured left arm. He was referred here after his condition had stabilized. On examination the patient was conscious, and there were multiple abrasions and contusions over his face and scalp. The left arm was already in a plaster cast with the elbow at 90 degrees; the neurovascular status of the left hand was normal. The patient complained of some pain in his left arm and also in the left upper quadrant of his abdomen and low in his back. On neurologic examination the extremities were normal. Also his vital signs were normal and stable.

Dr. Edward D. Henderson:

From the Mayo Clinic and Mayo Foundation, Rochester, Minnesota. Fracture Conference, June 24, 1968.

Dr. Milicic, what do you see on the roentgenograms? (Figure 1).

Dr. Milicic:

There is moderate forward displacement of the fourth lumbar vertebra. This vertebra is probably fractured laterally.

Dr. Henderson:

This is called "traumatic spondylolisthesis" and is not too common. Drs. Bickel and Sullivan wrote a paper on it a few years ago.

Dr. Chiroff:

In addition to this fracture, there was a transverse fracture of the shaft of the left humerus, which was treated by open reduction and fixation with a compression plate. However, here we are concerned with the spondylolisthesis. The patient was admitted to the intensive-care unit and was watched closely because of possible internal injuries along with the fractures. His course was uneventful during the next few days, his vital signs remained stable, and no condition of serious consequence developed in his abdomen. The left upper quadrant pain subsided. It was decided to



Fig. 1 (Case 1)—At admission. *Left*, Anteroposterior view, showing fractures of all lumbar transverse processes on left and of L-5 on right. Overlapping projection of inferior margin of L-5 with superior margin of sacrum suggests anterior displacement of L-5. *Right*, Lateral view shows a grade 3 "traumatic spondylolisthesis" of L-5 on sacrum with fracture of posterior elements of L-5.

treat the traumatic spondylolisthesis with skeletal traction, and two Steinmann pins were inserted in the distal part of the femurs for this purpose. Figure 2 shows the method by which traction was applied. Incidentally, the patient was six feet eight inches tall and extended over the end of the bed.



Fig. 2 (Case 1)—Balanced traction apparatus with pin in each distal femur. Traction is adjusted so that buttocks are suspended just off bed.

Dr. Henderson:

You may think we put him in traction in this position because he was so tall, but that is not the case. Enough weight was added to just get his buttocks off the bed. This, as you will see, is successful in reducing a traumatic spondylolisthesis. I did this about 10 years ago on another patient and I knew it would work.

As shown in Figure 3, the reduction was successful, leaving spondylolisthesis of less than grade 1 as compared to grade 3 before treatment.



Fig. 3 (Case 1)—Roentgenograms made with portable apparatus during balanced traction. *Left*, After one week of traction, anterior slip of L-5 on sacrum is now approximately that of grade 1 spondylolisthesis. *Right*, After one month of traction, slip of L-5 on sacrum is now minimal. Fusion was carried out three days later.

Dr. Chiroff:

At approximately six weeks after the application of the traction apparatus (seven weeks after the original injury) the apparatus was removed and a spinal fusion was performed (Figure 4). At the time these roentgenograms were made, the patient was wearing a corset-type back support and was ambulatory on crutches.

Dr. Henderson:

It is very difficult to read these roentgenograms, but I think the anterior edge of the sacrum can

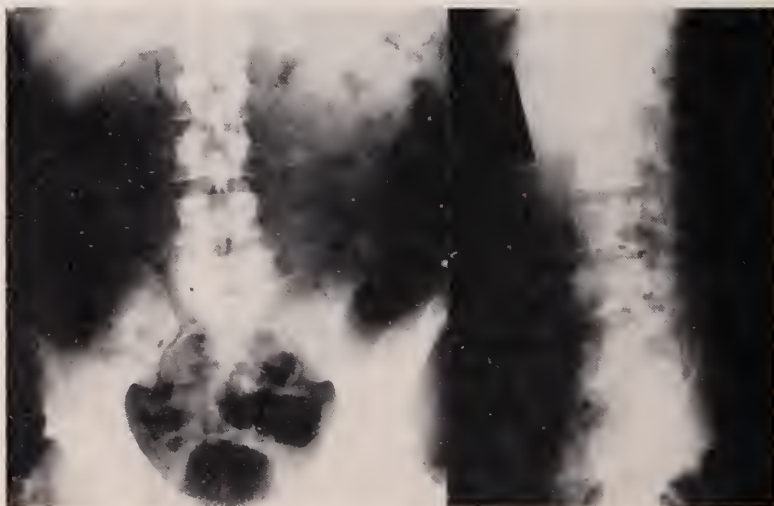


Fig. 4 (Case 1)—At three and a half weeks after fusion of L-4 to sacrum. *Right*, Anteroposterior view shows some evidence of forward displacement of L-5 on sacrum. Fractured transverse processes are healing. *Left*, Some loss of correction is evident.

be seen almost completely underneath the body of the fifth lumbar vertebra. The condition now is between grade 1 and grade 2 spondylolisthesis. You can see the defect in the pars interarticularis posteriorly.

Dr. Chiroff:

The second case is another example of traumatic spondylolisthesis in a 15-year-old white boy who was referred to the Mayo Clinic because of progressive scoliosis and sciatic pain down the left leg. The patient had no history of back difficulty or problem with his leg until March 1960 when he noted pain rather suddenly one day after broad jumping. He stated that at that time he had been broad jumping for more than a week and had the pain only after one particular jump. There was no radiation of the pain or paresthesia

in the leg, nor were there any problems with his bowel or bladder. He denied having any specific back pain at that time. He was not severely disabled at the time of onset of pain but said the pain had been getting progressively worse from March until July, and his mother stated that he had grown approximately three inches in the previous six months and that she had noted the scoliosis to be progressing.

On examination here, in August 1960, there was an obvious thoracolumbar scoliosis and tenderness in the posterior aspect of the left thigh. The patient leaned to the right when he stood. Straight leg testing gave positive results on the left side at 60 degrees, and the back motions were markedly limited. The roentgenograms are shown in Figure 5.

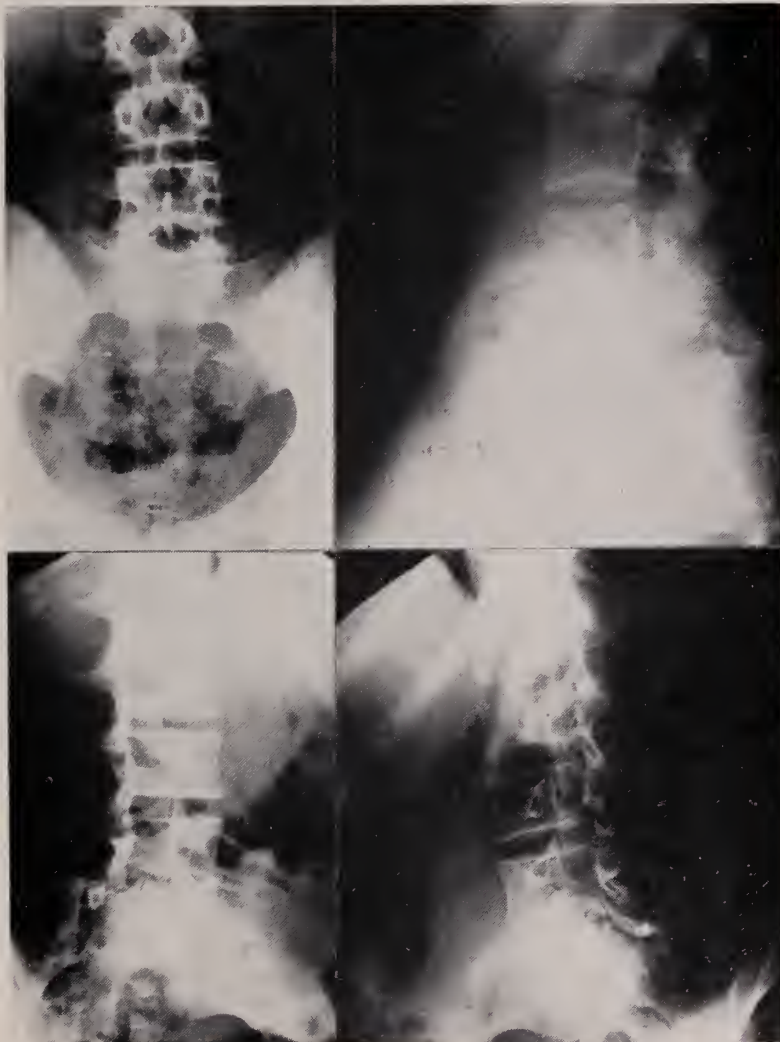


Fig. 5 (Case 2)—At admission, five months after injury, anteroposterior, lateral, and three-quarter views of lumbar spine all show spondylolisthesis of L-5 on sacrum with bilateral defects of neural arch.



Fig. 6 (Case 2)—Shortly after bone grafting from L-4 to sacrum. No attempt at reduction was made prior to insertion of grafts.



Fig. 7 (Case 2)—Anteroposterior (*Left*) and lateral (*Right*) views of lumbar spine two and a half years postoperatively. Flexion-extension views at this time showed no motion at L4-5 or L5-sacrum.

Dr. Henderson:

These show grade 3 spondylolisthesis of the fifth lumbar vertebra forward on the sacrum.

Dr. William H. Bickel:

One thing that strikes me is that the anterior superior lip of the sacrum is rounded off. It makes you wonder whether there was a pre-existing lesion there.

Dr. Henderson:

I agree. This may not be an acute spondylolisthesis. However, there surely is strong presumptive evidence of the traumatic origin of the symptoms at least and probably also of the roentgenographic findings. I thought that this condition justified surgical treatment. A spinal fusion from L-4 to the sacrum was done but no attempt was made to reduce the forward positioning of L-5 (Figure 6). Two and one-half years later he had

a solid spinal fusion and no complaints (Figure 7).

The two patients with acute spondylolisthesis are interesting and challenging. The first should have been put back in traction after the operation, but he had become so depressed in traction that this was impossible. Had we done this, however, we would probably have maintained the reduction. Also, it is interesting to speculate on whether or not we could have gotten union of the pars interarticularis fracture just by keeping him in traction and possibly have avoided the operation entirely. But his mental state prevented us from even thinking of this. In the second case, although five months had elapsed between the injury and referral of the patient to us, it is also interesting to speculate whether or not traction would have reduced the forward position of L-5. Again, practical considerations—this time, expense—prevented us from pursuing this approach.

Flint Laboratories

"Thyroid Disease as a Late Sequela of Radioactive Fallout" is the title of a new film from the Flint Laboratories division of Baxter Laboratories, Inc.

The 30 minute, full color-sound film was produced by Flint in conjunction with Brookhaven National Laboratory and the Atomic Energy Commission. It specifically covers the subject of thyroid disorders as related to accidental fallout of radioactive iodine on the people of Rongelap Island in 1954.

The film has won the Gold Camera, Cine, and New York Film Festival awards.

Booking arrangements may be made through: Professional Services Department, Flint Laboratories, 200 Wilmot Road, Deerfield, Illinois 60015.

Cover Photo

"Winter Scene"

This month's cover is a painting by Dr. Frances E. Schaar, a pediatrician in private practice in Minneapolis. She claims to be only a "Sunday painter" doing painting only for her enjoyment. The winter scene features children in one of Minneapolis' parks and was done by her three or four years ago after seeing a newsphoto printed in the Sunday Supplement.

Dr. Schaar was born in Wisconsin and taught school there. In 1947 she came to Minnesota and joined the staff of the Student Health Services at the University of Minnesota where she taught anatomy to nurses and medical technologists. Later she went into pediatrics as a resident.

Hypersexual Behavior Complicating Levodopa (L-Dopa) Therapy

SIDNEY K. SHAPIRO, M.D.

WITH THE INCREASED use of Levodopa in the treatment of Parkinsonism, complications from its administration are becoming more apparent. There are three large groups of complications: (1) Gastrointestinal effects; (2) Abnormal motor activity; and (3) Psychiatric disturbances. Other complications encountered less frequently are hypotension and associated traumatic fractures resulting from falling.

Frequent Psychiatric Complications

According to other reports, psychiatric complications may vary from 10 to 30 percent with 30 percent probably being more accurate. Among the side effects encountered psychiatrically, hypersexual behavior is one of the least common, being present in less than one percent of patients. This complication has received mention in the lay press, and perhaps, facetiously, some have suggested this drug may be the answer to impotence or to a decreasing sexual drive.

This report describes an interesting Parkinsonian patient who had a marked change in behavior in his sexual drive during Levodopa therapy. In addition, it calls attention to other psychiatric disturbances that may occur.

Case Report

A 76-year-old patient presented a classical picture of Parkinsonism which had been present for forty years. He had influenza in 1918 and subsequently developed postencephalitic Parkinsonism. On examination there was masking of the face, slurring of speech, moderate rhythmic tremor of the right hand and right upper extremity and a mild rhythmic tremor of the right foot. Moderate rigidity was present in the right arm and right leg and mild rigidity in the corresponding structures on the left. On examination of the mental status, the patient was oriented in the three spheres. No psychotic manifestations were in evidence and his stream of conversation was normal. The decision to give him a course of Levodopa therapy was made as a result of a progression in his symptoms over a two year period. Levodopa therapy was commenced on June 7, 1971.

The patient was initiated on gradually increasing doses of Levodopa over a period of 27 days and finally reached the level of five grams per day, one gram being given at 8 a.m., ½ gram at 10 a.m., ½ gram at 12 noon, one gram at 2 p.m., ½ gram at 4 p.m., and ½ gram at 6 p.m. and one gram at 8 p.m. The patient responded well, noting improvement in his gait and agility. Rigidity in his right leg decreased from moderate to mild. Associated movements reappeared in the left upper extremity while walking although the right upper extremity still did not swing freely. He also continued to have a mild tremor of the rhythmic type involving the right hand. His facial expression became more animated. Slurring of speech decreased and his general physical status seemed to show a definite improvement.

However, as the dose of Levodopa increased, the patient developed a marked increase in his libido. Advances towards the nurses on one station necessitated his being moved to another station. In spite of this change, this troublesome side effect persisted. A trial of Mellaril failed to decrease his renewed interest in sex. The patient became restless and developed difficulty sleeping. Finally, the patient was discharged on Levodopa, five grams daily at which time his social relationship with the nursing staff and other patients had deteriorated significantly. For example, he made little effort to avoid exposing himself, and made amorous advances towards some of the younger female patients on the floor.

Following the patient's discharge from the hospital, he was seen in the office on July 16, 1971. His increased sexual interests had caused him to become extremely nervous, restless, and unable to sleep. Interestingly, he then had stopped all of his Levodopa voluntarily stating that he would rather have his former disability than the increased sexual stimulation.

Readmission to the hospital was necessary because of a deterioration in his Parkinsonism and his medicine was re-regulated on a dosage of Artane five mg. three times a day, Benadryl 50 mg. three times a day and Levodopa 500 mg. four times a day. Some improvement in his Parkinsonism occurred, although at this dosage of Levodopa he continued to have excessive but tolerable sexual rumination and anxiety. This basic regime was continued until his discharge from the hospital. Subsequently the patient was lost to follow up care.

Discussion

General Psychiatric Side Effects

Psychiatric side effects of Levodopa therapy

Dr. Shapiro is a Clinical Professor of Neurology, University of Minnesota, Minneapolis. Reprint requests address to: Dr. Shapiro, 1218 Medical Arts Building, Minneapolis 55402.

have been thoroughly reviewed by Dr. Goodwin.¹ In order of frequency, the more common side effects encountered are confusion, delirium, depression, overactivity, restlessness, agitation, psychosis, delusions, paranoia, hypomania and impulsivity, increased anxiety, lethargy, insomnia and vivid dreams. Among the less frequently observed complications are those of hypersexual behavior such as this present patient demonstrates.

Hypersexual Symptoms

O'Brien et al.² reported six out of nine males receiving 4 to 6.5 grams of Levodopa per day had had spontaneous penile erections. Three of these men had been impotent for up to ten years. The reactions were sources of puzzlement and embarrassment to the older men and were usually not revealed unless questioned. Generally the erections were not related to sexual objects and were not accompanied by sexual fantasies. Three of the men, however, reported an increase in libido. One formerly impotent man was able to resume satisfactory sexual intercourse.

Use In Impotence

A trial of Levodopa in a small group of men with primary psychogenic impotence resulted in a transitory improvement in sexual performance in one half of them.³ It must be assumed that Levodopa has a questionable primary value in the treatment of a decreasing sexual drive or impotence in an individual.

In some instances such as our current patient, this increased interest has exceeded the bounds of normalcy and has led to excessive sexual drive and inappropriate behavior. In some instances,

the symptoms of hypersexuality occur in association with other symptoms suggestive of hypomania such as poor judgment, grandiosity, hyperactivity, rapid speech and euphoria. The patient under consideration here demonstrated in addition to the hypersexuality, euphoria, restlessness and sleeping difficulty. Although he had been unable to obtain an erection, he had thought repeatedly about it and felt that he would be able to have an erection in the future. He freely admitted to a greatly renewed interest in sex, and his behavior in the hospital ward came very difficult to control because of his advances toward the nursing staff and female patients.

It is possible that a biochemical effect of dopamine on central nervous system pathways may account for a specific "aphrodisiac" effect. Also, it may be concomitant with improvement in motor function. However, it is felt more likely that the change in sexual behavior is part of a general hypomanic syndrome in the type of patient as described above. Generally the psychiatric side effects of Levodopa therapy are reversible with the adjustment of dosage. In this patient, a decreased dosage failed to completely relieve this troublesome complication although unfortunately the Parkinsonism likewise was not as well controlled as at the higher levels of Levodopa.

Summary

1. Psychiatric complications of Levodopa therapy are common.
2. A patient with hypersexuality—an unusual psychiatric complication of Levodopa therapy—is presented.

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[Smoking is] a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black stinking fumes thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless.*

*King James I of England, Counterblast to Tobacco, 1604.

Case Report

Polycythemia Vera with Acute Budd-Chiari Syndrome

KLAUS RETZLAFF, M.D. AND JAMES J. MONGE', M.D., M.S.

WE RECENTLY had the opportunity to see a patient with polycythemia vera associated with an acute Budd-Chiari syndrome. The outstanding aspects of the case were obstruction of the hepatic veins and the inferior vena cava, abdominal discomfort, ascites, and hepatomegaly with disturbed liver function. Necropsy examination confirmed the diagnosis.

Case Report

A 55-year-old white female stenographer developed right upper abdominal discomfort in January, 1972 and, after three weeks of mild dyspnea, noted increasing abdominal distress "with a heavy feeling." When she made her first visit to her physician on March 22 (1972) he noted ascites, an enlarged liver, and a non-tender pelvic mass the size of a six-month pregnancy. The white blood count was 11,600 cu mm, the hemoglobin 19.0 grams percent, and the hematocrit 59 percent.

Her doctor performed a laparotomy on March 28, 1972. After 4,000 cc. of straw-colored fluid was aspirated, the liver was noted to be enlarged and nodular. Liver biopsy showed "dilated sinusoids with vascular congestion." The pelvic mass proved to be a degenerated benign leiomyoma weighing 1800 grams; a hysterectomy was done. Following surgery the patient drained massive amounts of ascitic fluid through the incision.

On April 14 the wound dehiscd and she was transferred to -St. Luke's Hospital, Duluth. On arrival she was weak, dehydrated and hypotensive and still draining 400 ml. of ascitic fluid per day. Examination disclosed an ill-appearing woman. Her pulse was regular, the heart tones were normal and the lungs were clear to auscultation and percussion. The neck veins were flat, the hepatojugular reflux was absent, and there was no evidence of cardiac insufficiency. The liver was enlarged to four fingers below the subcostal margin but the spleen was not palpable. No other abdominal masses were noted and pelvic examination was not remarkable. There was edema of the vulva and of both thighs.

Laboratory work revealed a white blood cell count of 42,000/cu mm, hemoglobin 19.8 gms. percent, urinalysis normal, blood urea nitrogen 70 mg. percent, serum sodium 126 meq/l, potassium 5.8 meq/l, and chloride 96 meq/l. The serum SGOT was 1,990, LDH 250, and alkaline phosphatase 121. The serum ammonia was 183 mcg. percent. Total serum bilirubin was 1.6 mg. percent, serum albumin 2.1 and serum globulin 1.4 gms. percent.

On April 19, after correction of the dehydration,

hypoalbuminemia and hyponatremia with intravenous fluids, the white blood count was 28,000/cu mm, hemoglobin 15.9 gms. percent, serum albumin 3.8 gms. percent, globulin 1.4 gms percent and blood urea nitrogen 20. A liver photoscintigram showed a very small area of uptake over the right lobe of the liver, a much enlarged left



Fig. 1—Large thrombus originating from left hepatic vein and extending into the inferior vena cava and right atrium.



Fig. 2—Liver Sections: (Left) Fibrotic infarcted right lobe. (Middle and Right) Enlarged and congested left lobe with thrombosed hepatic veins.

From the Duluth Clinic, Duluth, Minnesota.

lobe with irregular uptake, and increased uptake over the spleen and spine.

Extensive bleeding due to portal hypertension was encountered at exploratory laparotomy on April 21. The surgeon noted congested veins in the abdominal wall and in the intestinal mesentery. The left lobe of the liver was large, firm, and markedly congested, whereas the right lobe of the liver was very small and atrophic. Needle biopsy of the left lobe of the liver again revealed dilatation of the sinusoids with destruction of hepatic cells and bile stasis. There was no evidence of hepatitis,

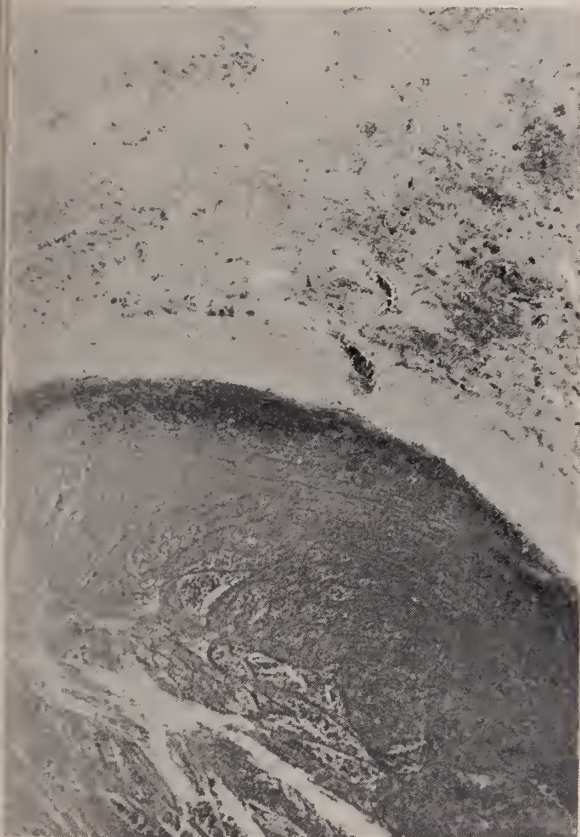


Fig. 3—Left lobe of liver: Congestion and fibrosis with organized thrombus in major hepatic vein (hematoxylin and eosin X 40).

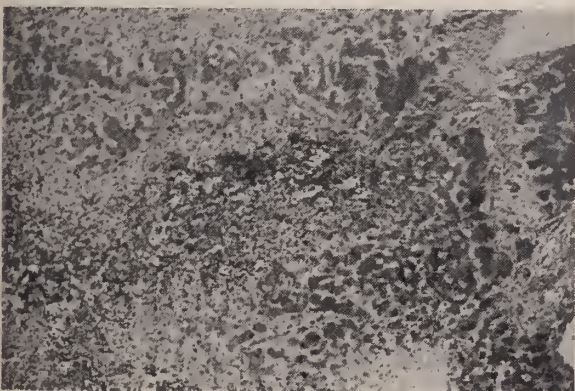


Fig. 4—Left lobe of liver: Marked central congestion and necrosis of parenchymal cells (hematoxylin and eosin X 100).

cirrhosis or malignancy. Ascitic fluid was negative for malignant cells.

Despite having received no transfusions the hemoglobin rose to 16.5 gms. percent on April 25 with an elevated reticulocyte count of 5.3. Serum ammonia determinations, SGOT, and LDH remained elevated. The patient's condition gradually deteriorated and she became icteric. Seven days after operation she began to have upper gastrointestinal bleeding and oliguria, became unresponsive and died two days later.

Necropsy revealed a deeply jaundiced female with right pleural effusion and ascites. The right lung was atelectatic and sectioning revealed areas of old infarction. A small embolus was found in the pulmonary artery to the lower lobe of the left lung. There was an acute inflammatory infiltrate in the pulmonary alveoli with microabscesses and areas of pulmonary infarction. Pseudomonas organisms were cultured from the pleural effusion. The heart was normal size and the coronary arteries showed moderate arteriosclerosis. The large esophageal varices present were intact. There was a large perforated duodenal ulcer and the stomach was filled with bright red blood. The spleen weighed 400 grams and histologically showed congestion and early fibrosis.

When the inferior vena cava was opened a large organized thrombus, measuring five cm. in length and three cms. in diameter, was seen to originate in the left hepatic vein. The large bulbous tail of this thrombus extended into the right atrium of the heart (Figure 1).

The right lobe of the liver was fibrotic and small. The left lobe was markedly enlarged and severely congested; most of the large hepatic veins were filled with thrombi (Figure 2). The gallbladder and the common bile duct were normal. No gallstones were found. On microscopic examination the left lobe of the liver showed marked congestion with distorted parenchyma in the region of the central veins and organized thrombi in the larger veins (Figures 3 and 4). The right lobe of the liver showed extensive necrosis with fibrous tissue replacement (Figure 5).

The sections of bone marrow were compatible with polycythemia vera, exhibiting a marked hyperplasia of the myeloid and erythroid elements with a myeloid-erythroid ratio of 2:1.

Discussion

The appearance of the bone marrow was typical of polycythemia vera and the peripheral blood counts and reticulocyte count remained elevated. Unfortunately, blood volume studies were not performed.

The complete destruction of the lobular histology with extensive fibrosis of the right lobe of the liver indicates that right hepatic vein occlusion most likely occurred some months prior to the terminal illness (early recanalization of the occluded right hepatic veins was seen). Subsequent obstruction of the main left hepatic vein by thrombus produced severe liver failure and ascites,

and extension of this thrombus to obstruct the inferior vena cava resulted in anasarca of the lower body. Oliguria, hyperkalemia, and azotemia followed, although the kidneys were anatomically normal at autopsy.

Hepatic vein thrombosis was first described by Budd¹ in 1845, and fifty years later Chiari² described hepatic endophlebitis. The presence of Budd-Chiari syndrome can be confirmed by inferior vena cava and hepatic venograms.³ Liver scan shows diminished and irregular uptake, similar to that in advanced cirrhosis, with increased splenic and bone marrow uptake. Parker⁴ studied 49 cases of autopsy-proven symptomatic hepatic vein occlusion and found that polycythemia vera was the most common underlying disorder (Table 1). Sohval⁵ has also described hepatic vein thrombosis in polycythemia vera. Hypernephroma is the next most common disorder. Other recently described causes of hepatic vein occlusion are oral contraceptives,^{6,7} membranous obstruction of

the inferior vena cava⁸ and *Aspergillus* hyphae in patients with acute leukemia.⁹

Therapy of the Budd-Chiari syndrome is largely symptomatic, with specific therapy directed at the underlying cause.

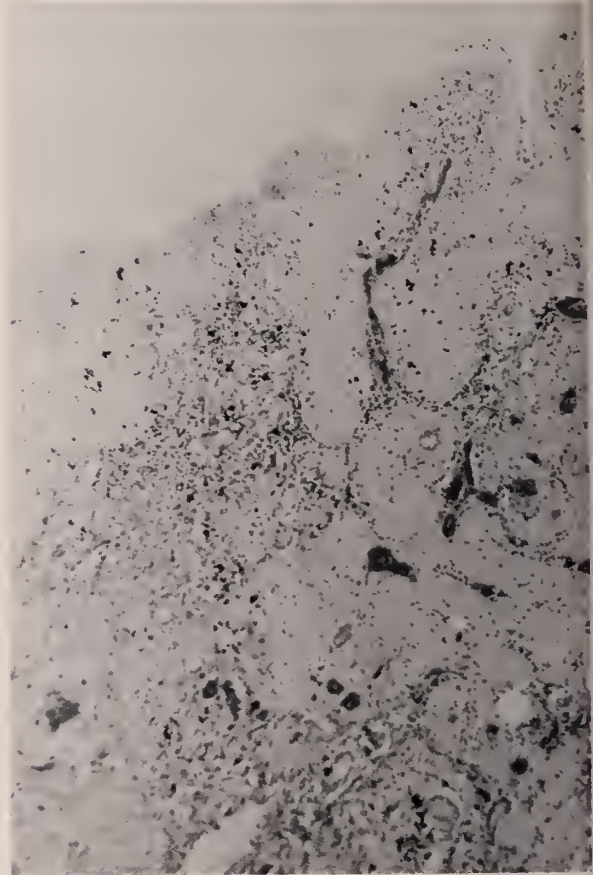


Fig. 5—Right lobe of liver: Fibrous replacement of liver cells with intact bile ducts (hematoxylin and eosin X 40).

TABLE 1
Cause of Symptomatic Hepatic
Vein Occlusion in 49 Cases*

Polycythemia vera	14	Congenital abnormality	
Hypernephroma	9	of vena cava	1
Tumor of vena cava	5	Leukemia	1
Gumma	3	Sickle cell anemia	1
Trauma	2	Schistosomiasis	1
Ulcerative colitis	2	Primary carcinoma	
Hydatid disease	2	of liver	1
Carcinoma of lung	2	Reticulosarcoma	1
Secondary liver tumors	2	Secondary adrenal	
		sarcoma	1
		Carcinoma of pancreas	1

*Parker RGF: Occlusion of Hepatic Veins in Man. *Medicine* 38:369, 1959.

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Venereal Disease

To begin with, there was this strange fact; though the infection was there, the moon had often four times circled the earth before clear symptoms of the disease appeared. For when it has once been received into the body it does not immediately declare itself; rather it lies dormant for a certain time and gradually gains strength as it feeds. Meanwhile, however, the sufferers, weighed down by strange heaviness and irresistible langour, are going through life with increasing weakness, moving sluggishly in every limb. Their eyes, too, have lost their natural keenness; the colour is driven from their faces and deserts their unhappy brows.—Ghirolamo Fracastoro (1483-1553)

The Anxiety-Ridden Patient in Office Practice

PHILIP MARGOLIS, M.D.

ANXIETY ACTUALLY is helpful to many people. It is a warning that something may be wrong. Its development is the result of a conflict or problem often triggered by a difficult situation whereby an external stress stimulates internal stresses. Anxiety often manifests itself in physical symptoms which can lead the patient to seek help from his doctor. He usually has a positive trustful image of his doctor as a man who understands him and from whom he may obtain relief. Thus positive rapport is built in and the doctor is in a good position to assist the patient.

The physician listens to the patient and allows him to ventilate his concerns. He does a careful physical examination, which is generally negative, and the results are reassuring to the patient. The anxiety is relieved by the ministrations of the physician—by his listening, by his actions, and by his reassurance.

Often only one or two visits are necessary, plus or minus several phone calls at which time the physician makes himself available for a few minutes—the telephone has been underestimated as a therapeutic tool.

Thus a combination of support (which includes the examination), the encouragement of catharsis, the occasional use of drugs, and (perhaps) some authoritarian advice around a real-life situation, i.e., environmental manipulation) make up the therapeutic operations of the physician on behalf of the patient having anxiety symptoms.

The majority of anxious patients are handled successfully in the office. The important point is to pay full attention to the patient during the history taking which includes a mental status evaluation. The doctor is interested in what the patient wants to talk about, avoiding arguments and severe judgements. He encourages the patient to

talk *during* the physical examination (“What I’m really scared to death about is that I might have cancer”), reassures (“I understand how you feel. This is a common problem.”), utilizes suggestion (“These pills will give you a good night’s sleep.”), may be educative (“Let’s talk about what happens during the sex act.”), gives guidance and advice (“It sounds like this job would be worthwhile.”)

Listening is “trump”; when in doubt, play “trump” and, even if you don’t understand and one can’t always, listen anyway. A story is told about Dr. Helena Deutsch, a psychoanalyst in Boston, during a period when she was living in a hotel after she first came to the United States from Vienna. A room clerk, having heard of her skills, sought an interview with her to talk over some problems. Years later she met him and he told her that she had “helped him to clear up his difficulties completely.” The punch line of the story is this: At the time of the interview she had had great difficulty in understanding his English. But—she listened.

Environmental modification may be surprisingly helpful. One parent was extremely anxious because her child was in the hospital for a routine tonsillectomy but she wasn’t allowed to visit. Allow parents to visit their children in the hospital. A woman who resented her feminine role (“women’s lib?”) as a housewife was encouraged to get a job and hire a housekeeper to take care of the children. A lonely, elderly patient was helped to find appropriate social and recreational outlets—the physician should be aware of community resources. An anxious father and an anxious mother brought their even more anxious child to a pediatrician who quickly discovered that the child—age five—had been sleeping in his parent’s room all of his life. It was quickly pointed out in an authoritarian way that removing the child from the bedroom would be most helpful to all concerned. It was.

Let us suppose that on completion of the history and physical examination a patient is believed

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to be suffering primarily from an anxiety reaction or psychogenic cardiovascular reaction. What next? "... 'Mr. Jones, after a thorough examination I do not believe you have any serious heart disease, although you have suffered from distressing chest pain and are naturally concerned about it. The pounding and skipping of your heart, I believe, results from a nervous reaction rather than from disease in your heart. For instance, if you walked down a dark alley at night and a masked bandit suddenly stuck a gun in your ribs, I am sure your heart would beat very fast and hard—not because it was bad, but in response to the nerve impulse that went out because of the fear you were experiencing. Your breath would also come short and fast and your hands would be wet and shaking as they were when you came into the office. Prolonged worry, tension, anger, or anxiety can produce the same nervous impulse as intense fear. That this is probably a factor in your case is suggested by the appearance of your symptoms shortly after the arrival of the new foreman with whom you are having trouble . . . You are afraid that your heart is bad, and as a double check I suggest we get an electrocardiogram, chest Xray, blood test and urinalysis as a part of a complete medical evaluation. I expect they will be normal. Even if they aren't, I am sure most of your symptoms result from nervous causes since no form of heart trouble can completely explain your symptoms while a tension state readily can.'"

It is important that a positive diagnosis be made before doing the laboratory studies—the physician thus shows confidence in his diagnosis. As each normal laboratory study is reported, the patient's confidence in the physician is increased. If he orders extensive laboratory studies without telling the patient he expects them to be negative, with each normal finding the patient's esteem for the physician will drop. The patient assumes the tests were ordered to find out what was wrong. When the physician finally tells the patient his symptoms are due to nervous factors, it appears he is saying this because he has been unable to find anything abnormal with the tests. To the patient, it looks like an alibi, his confidence in the doctor is shaken, and the usual story is for him to consult a different physician who, too often, 'does some different tests'.¹¹

Anxiety may accompany depression and may even help create a suicidal state. If indeed the pa-

tient is overwhelmed by his anxiety, if he manifests a panic reaction which does not appear to respond to the above procedures, hospitalization—either in a medical or psychiatric ward (preferably of a general hospital) is recommended. If the anxiety is accompanied by serious suicidal/homicidal thoughts, or evidence of a reality breakdown or confusional (possibly organic) symptomatology, placing the patient in the hospital is the treatment of choice.

If the patient presents a puzzle, i.e., if some of the causes of anxiety are unknown and if the patient is not responsive to initial help, the doctor is well advised to seek a consultation from a psychiatrist; the patient may be temporarily referred, not for treatment, but for consultation. A consultation is really evidence of continuing concern on the part of the physician, not a wish to avoid further contacts. The physician maintains interest in the patient but is simply in doubt about the diagnosis or treatment plan. If the physician is uncertain as to whether the patient is suicidal/homicidal, if he wants to clarify a possible delusional content of the patient's thought processes, if the patient exhibits a behavior disorder (e.g., peeping tom), of very recent onset, the doctor may wish to obtain advice from a mental health consultant. Sometimes the psychiatrist will wish to see the patient; at other times a telephone conversation or personal get-together between physicians will suffice.

In some cases a referral for psychiatric treatment is both necessary and appropriate. Anxiety comes in many forms, including a conversion reaction, a phobic reaction, a severe anxiety neurosis, and the like. Sometimes the physician is confronted with a moderate to severe psychophysiologic reaction (peptic ulcer, neurodermatitis, etc.) and he may wish to treat the ulcer medically while a psychiatrist treats the neurosis.

If a referral is contemplated, be straightforward and frank about the reasons for the referral. Place a referral in the same light as a referral to any other specialist. It is important, incidentally, to consult with the psychiatrist before broaching referral to the patient. The patient may object. He may say that psychiatrists treat only the insane. It is well to point out that indeed psychiatrists treat people who are emotionally upset and that the patient is definitely not insane. The patient may say "I don't know this new man." It is true the transition may be difficult, but the doctor must

indicate that he is not deserting the patient but is acting as a continuing central management agent or coordinator. The patient may not wish to lose his organic tag. In other words he may want to continue to think that his problems are all "medical-physical." However, if you wish to make a referral you must stand firm rather than saying, "Okay, we'll try vitamins for awhile on the chance that it might be a vitamin deficiency." Hypochondriasis is a way (among others) of channelling anxiety. Hypochondriacal symptoms are treatable—perhaps over an extended period of time—by the general physician. In fact, the hypochondriac is chronically ill. However, periodic visits to his physician—once a month or even less often—will maintain the hypochondriac, diminish his symptoms (at least temporarily), keep him functioning, and even keep him happy. The relationship with the physician, the physical examination and laboratory studies, and a judicious change of medication will insure a functional cure if not a symptomatic one. The hypochondriac relates through his symptoms which must be respected though not encouraged.

Finally, some general practitioners may have the time, energy, the skills, and the interest to do crisis intervention—brief psychotherapy.

An individual (or family) is in crisis when an immediate stress situation interferes with previous coping or problem-solving capacities to handle the situation and to come up with a solution. As Caplan says, it is a "time-limited period of psychological disequilibrium." There are all types of crises including those that involve a role transition (pregnancy) and those which involve hazardous events or chance happenings (illness, death). A crisis is a threat, a loss, or a challenge out of which a variety of emotional signs and symptoms may emerge. During a crisis, anxiety may be the most prominent symptom and the doctor who is often the "family friend" is usually the first person to whom he will turn. There is urgency about a crisis that makes a person unusually receptive to guidance and assistance. In fact, a crisis presents an optimal therapeutic moment due to the individual's readiness to seek and to respond to help.

Crisis intervention requires one to 10 sessions. During the course of treatment the physician utilizes a variety of plausible intervening techniques—clarifying feelings, outlining consequences of behavior, gently confronting the patient with real-

ity, appraising the patient's accomplishments (assets and liabilities), giving advice and reassurance. Exercising authority, making suggestions, setting time limits in advance, focusing on specific issues—all these methods are fair game to be flexibly employed. Termination is accomplished when symptoms are relieved and the patient is able to handle the current situation. In essence brief therapy then is goal-limited and problem-oriented. The physician is a listener but may also be active. He expects the patient to improve rapidly, at least as far as his symptoms are concerned. The thesis of crisis intervention is that for many patients therapy may stop after specific resolution or may act as a prelude to further treatment. For many, it is further treatment.

One example will suffice. Mrs. B. is a young woman, currently separated from her husband. Her chief complaint was a severe and constant anxiety, accompanied by palpitations. Past history included the death of her father eight years previously, the recent remarriage of her mother, and frequent hospitalizations for rheumatic carditis and congestive heart failure. Therapy consisted of four visits, at which time the origins of her anxiety were defined, "sorted out" and discussed. The origins centered around her "heart" difficulties, (e.g., her father had died of heart disease); some "grief work" was accomplished regarding her father's death and the failure of her marriage. Some concerns about her sexual drives and herself as a divorcee were analyzed. Clarification and support were given, directed to feelings of inferiority, stemming back to adolescence. Mrs. B. became asymptomatic; she has since obtained a divorce and has a satisfying job.

General physicians should be able to treat the milder anxiety conditions of recent onset. Some of the more chronic emotional conditions if not involving any active risk probably can be handled better in a palliative, supportive way by a general physician than by a psychiatrist. The most common error in psychiatric referral by general physicians is to refer the chronic hopeless cases who can only be supported and to hang on too long to moderately severe psychoneurotic patients who might be cured by intensive psychiatric treatment. If there is a good working arrangement with a psychiatrist, the borderline patients can be seen by him and returned to the general physician who continues supportive treatment in accordance with specialized advice.

Let's compare the anxiety-ridden patient with the patient who actually has heart disease. There are three methods of treatment: (1) Adaptation—the physician strengthens the conscious, adaptive functions of the personality via psychological support. He restores emotional homeostasis. With the heart patient he prescribes rest, medication, and diet. (2) A reduction of environmental stress—The physician uses environmental modi-

fication and manipulation, thereby alleviating the patient's anxiety. For the heart patient he prescribes a first-floor apartment rather than a third-floor walk-up. (3) Structural change—The physician usually refers the anxiety patient to a psychiatrist for intensive psychotherapy in order to define and to reduce internal (intrapsychic) pressures and conflicts. For the heart disease patients he may recommend cardiac surgery.

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LeRoy G. Berglund
Project Director
Northlands Regional Medical Program

The Physician Associate Program of the University of Minnesota Medical School

STEPHEN NYE BARTON

THIS ANALYSIS of a year's experience as a Physician Associate summarizes the program as it evolved in Cloquet, Minnesota. In the discussion below it will become evident that the Physician Associate has opportunities unique to this program which are of benefit to himself, his adopted community, and the medical school. Programs of this nature are educational and will enhance the delivery of health care in the state.

The preceptors were Cloquet physicians R. R. and R. H. Puumala. The student gradually became the doctor with his own patient population. Further, the physician associate had the opportunity to see disease and the consequences to the family develop over an extended period of time.

Each month one member of the University of Minnesota Department of Family Practice and one member of a specialty area visited Cloquet to participate in a clinical conference presented by the physician associate and his preceptors. This encouraged communication between the larger university medical complex and the rural physicians while at the same time fostering continuing

medical education.

Total Care

The Puumala Clinic is the center for the practice of preventive medicine, screening, and family medicine. The student doctor learns that the office must not become a contest for maximum volume but must emphasize the total needs of the patient. A child enters the clinic with a sore throat bringing a mother who has sexual frustrations and is considering divorce. The child's father is at work driving a truck trying to feed the family. A clinic oriented to maximum volume might treat the sore throat and overlook the more significant problems. The Physician Associate must consider the mother, her husband, her children, grandparents, and others.

Comprehensive Care

The delivery of emergency or acute care includes the treatment of allergic reactions, the application of plaster casts or splints after reduction of common fractures, repair of lacerations, treatment of cardiac arrhythmias and congestive heart failure. The physician associate makes



Figure—From the left: Stephen Nye Barton, student doctor, Dr. Robert Mathog, professor in the specialty of ears, nose and throat, Dr. Reino Puumala and Dr. John Verby, professor in family practice at the U of M.

house calls on the terminally ill and elderly that are not able to visit the office. House calls are also made to study and treat a family in the home environment.

Rounds in nursing homes were made. Episodic care was also given. The student becomes aware of problems unique to the institutionalized geriatric population. The cost, the family concerns or lack of care, the patient's initial disorientation and gradual adjustment, the use of vocational rehabilitation, and the usefulness of physical therapy are just a few of the factors that can best be perceived over a period of one year. The author also did physical examinations for the retarded and mentally disturbed.

Hospital Rounds

Daily rounds are made at the hospital on ten to fifteen patients. Being the only student allows maximum contact with the preceptors, the staff, and other hospital personnel. The student does histories and physical examinations on new patients. A problem list and provisional diagnosis is made and reviewed by the preceptor. The initial treatment and tests are planned around a theme of minimum cost for effective unit of health care rather than attempting to maximize the amount of information without regard to cost.

Consultation and Referral

Consultation is held with the pathologist, and the radiologist as well as other members of the medical staff. Microscopic slides and laboratory tests were studied. Further, it was a privilege to visit the departments of pathology and radiology at St. Luke's hospital in Duluth for consultation. Cases are referred to major medical centers by the student and preceptor if they are beyond the scope of the Cloquet physicians. If a patient fails to recover the medical student attends the autopsy.

Surgery

After morning rounds the physician associate regularly assists in surgery. A typical day might include a cholecystectomy, appendectomy, hip pinning, hernia repair, or gastric resection. Emergency surgery included a ruptured spleen, torn liver, and contused pancreas.

The physician associate is exposed to an extensive oncology population and sees tumors of all organs from carcinoma of the tongue to lymphosarcoma of the rectum. Before surgery the student studies the anatomy, surgical technique, and the pre- and postoperative management of the care. By the end of the year a physician associate is able to diagnose many of the common surgical entities. The student admits the patient, writes the preoperative orders, with the close supervision of the preceptor performs or assists in the surgery, orders the postoperative care, and follows the patient out of the hospital to see him in the office at regular intervals. On occasion the student plays a strategic role. An emergency cesarean section is a case in point. Following the course of labor in a multipara a prolapsed cord was discovered by the author. After notifying the surgical anesthetist and nursing team on call to arrange for immediate action, the attending physician was called and a live baby was rescued within an hour. Thus, in the physician associate program the student progresses in responsibility as he demonstrates competency, but always has the preceptor for consultation and backup. In conclusion, a Physician Associate in a rural town can learn while helping to deliver medical care to the community.

Acknowledgments

Appreciation to Ricard R. Puumala, M.D. and Reino R. Puumala, M.D., my preceptors; To Jack Verby, M.D., for introducing me to the program; To John O'Leary, M.D., for encouragement throughout the year; To Joe Connolly, M.D., for suggesting I write this article.

Great truths are portions of the soul of man; great souls are portions of eternity.
—J. R. Lowell, *Sonnets*. No. vi.

There is no great concurrence between learning and wisdom—Francis Bacon.

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Thyroxine (T_4) is, as you know, the major circulating hormone produced by the thyroid gland. It is also produced, in smaller amounts, and is active at the cellular level. For years it has been a working hypothesis among endocrinologists that T_4 is converted by the body to T_3 . In 1970 this process, called "iodination," was demonstrated by Braverman, Ingbar, and Sterling². T_4 does convert to T_3 , though the precise quantities are still being studied.

The conversion has been experimentally demonstrated during the administration of T_4 to athyrotic patients. Their thyroid status is normalized on SYNTHROID alone, but the presence of T_3 in these patients has been clearly shown.

WHY DOES SYNTHROID COST LESS THAN SYNTHETIC DRUGS CONTAINING T_3 ?

Very simple. T_3 costs more to make synthetically than does T_4 . So it is economically necessary for a synthetic thyroid medication containing T_3 to cost more than one containing T_4 alone. Synthetic combinations cost patients nearly 50% more than SYNTHROID³ because the T_3 costs more to start with; also there is the additional expense of formulating a tablet containing two active ingredients.

1. Latiolais, C. J., and Berry, C. C.: Misuse of Prescription Medications by Outpatients, *Drug Intelligence & Clin. Pharm.* 3:270-7, 1969.
2. Braverman, L. E., Ingbar, S. H., and Sterling, K.: Conversion of Thyroxine (T_4) to Triiodothyronine (T_3) in Athyrotic Human Subjects, *J. Clin. Invest.* 49:855-64, 1970.
3. American Druggist BLUEBOOK, March, 1971.

Synthroid[®]

(sodium levothyroxine)

THE FACTS ARE CLEAR AND HERE IS OUR OFFER.

FACTS:

Synthetic thyroid drugs are an improvement over animal gland products. Patients, even athyrotic ones, can be completely maintained on SYNTHROID (T_4) alone. Thyroid function tests are easy to interpret since they are predictably elevated when the patient adheres to SYNTHROID. Of all synthetic thyroid drugs, SYNTHROID is the most economical to the patient.

OFFER:

Free TAB-MINDER medication dispensers to start or convert all your hypothyroid patients to SYNTHROID. Free information to physicians on role of thyroid function tests in a new booklet titled: "Guideposts to Thyroid Therapy." Ask us.

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Specific replacement therapy for diminished or absent thyroid function resulting from primary or secondary atrophy of the gland, congenital defect, surgery, excessive radiation, or antithyroid drugs. Indications for SYNTHROID (sodium levothyroxine) Tablets include myxedema, hypothyroidism without myxedema, hypothyroidism in pregnancy, pediatric and geriatric hypothyroidism, hypopituitary hypothyroidism, simple (nontoxic) goiter, and reproductive disorders associated with hypothyroidism. SYNTHROID (sodium levothyroxine) for Injection is indicated for intravenous use in myxedematous coma and other thyroid dysfunctions where rapid replacement of the hormone is required. The injection is also indicated for intramuscular use in cases where the oral route is suspect or contraindicated due to existing conditions or to absorption defects, and when a rapid onset of effect is not desired.

Precautions: As with other thyroid preparations, an overdose may cause diarrhea or cramps, nervousness, tremors, tachycardia, vomiting and continued weight loss. These effects may begin after four or five days or may not become apparent for one to three weeks. Patients receiving the drug should be observed closely for signs of thyrotoxicosis. If indications of overdose appear, discontinue medication for 2-6 days, then resume at a lower dosage level. In patients with diabetes mellitus, careful observations should be made for changes in insulin or other antidiabetic drug dosage requirements. If hypothyroidism is accompanied by adrenal insufficiency, as Addison's Disease (chronic subcortical insufficiency), Simmonds's Disease (panhypopituitarism) or Cushing's syndrome (hyperadrenalism), these dysfunctions must be corrected prior to and during SYNTHROID (sodium levothyroxine) administration. The drug should be administered with caution to patients with cardiovascular disease; development of chest pains or other aggravations of cardiovascular disease requires a reduction in dosage.

Contraindications: Thyrotoxicosis, acute myocardial infarction. **Side effects:** The effects of SYNTHROID (sodium levothyroxine) therapy are slow in being manifested. Side effects, when they do occur, are secondary to increased rates of body metabolism; sweating, heart palpitations with or without pain, leg cramps, and weight loss. Diarrhea, vomiting, and nervousness have also been observed. Myxedematous patients with heart disease have died from abrupt increases in dosage of thyroid drugs. Careful observation of the patient during the beginning of any thyroid therapy will alert the physician to any untoward effects.

In most cases with side effects, a reduction of dosage followed by a more gradual adjustment upward will result in a more accurate indication of the patient's dosage requirements without the appearance of side effects.

Dosage and Administration: The activity of a 0.1 mg. SYNTHROID (sodium levothyroxine) TABLET is equivalent to approximately one grain thyroid, U.S.P. Administer SYNTHROID tablets as a single daily dose, preferably after breakfast. In hypothyroidism without myxedema, the usual initial adult dose is 0.1 mg. daily, and may be increased by 0.1 mg. every 30 days until proper metabolic balance is attained. Clinical evaluation should be made monthly and PBI measurements about every 90 days. Final maintenance dosage will usually range from 0.2-0.4 mg. daily. In adult myxedema, starting dose should be 0.025 mg. daily. The dose may be increased to 0.05 mg. after two weeks and to 0.1 mg. at the end of a second two weeks. The daily dose may be further increased at two-month intervals by 0.1 mg. until the optimum maintenance dose is reached (0.1-1.0 mg. daily).

Supplied: Tablets: 0.025 mg., 0.05 mg., 0.1 mg., 0.15 mg., 0.2 mg., 0.3 mg., 0.5 mg., scored and color-coded, in bottles of 100, 500, and 1000. Injection: 500 mcg. lyophilized active ingredient and 10 mg. of Mannitol, N.F., in 10 ml. single-dose vial, with 5 ml. vial of Sodium Chloride Injection, U.S.P., as a diluent. SYNTHROID (sodium levothyroxine) for Injection may be administered intravenously utilizing 200-400 mcg. of a solution containing 100 mcg. per ml. If significant improvement is not shown the following day, a repeat injection of 100-200 mcg. may be given.



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It's about time somebody told the true story of the American Doctor

You'd agree 100% on that. There have been too many of the other kind of story.

You know that the vast majority of American doctors are honest, hardworking, skilled and dedicated human beings who have the interests of their patients at heart.

That's exactly what the AMA is trying to make the public aware of.

One of the many ways the AMA is doing it is through its special communications program.

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American Medical Association
535 North Dearborn Street/Chicago, Illinois 60610



History

Lafayette Houghton Bunnell. M.D.

of Homer, Minnesota

Discoverer of the Yosemite

EDWARD E. HARNAGEL, M.D.

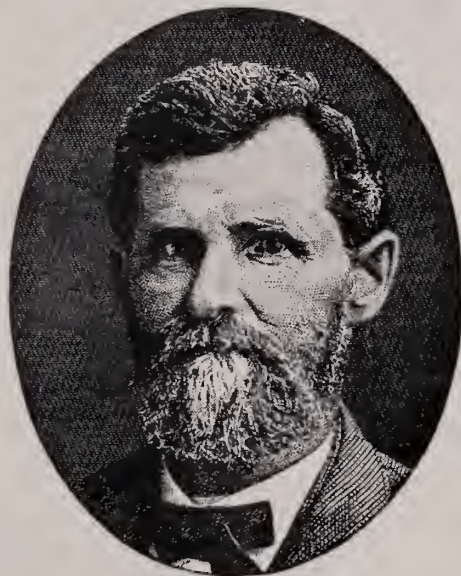
MEDICINE HAS contributed many explorers and adventurers—Thomas Dover, Mungo Park, David Livingston, Marcus Whitman, Wilfred Grenfell are but a few of these. In contemporary times three of the 19 members of the 1963 Mt. Everest expedition were physicians; one of the six who reached the summit was an anesthesiologist. Pioneer physicians in impressive numbers explored the vast wilderness regions of this country and recorded their findings in logs, journals, memoirs and books. One of these was Dr. Lafayette Houghton Bunnell, a practitioner for many years in Homer, Minnesota, a tiny hamlet on the Mississippi a few miles south of Winona. He received scant recognition during his life for an exploratory venture in his youth, the discovery of one of the world's great natural wonders, the magnificent Yosemite Valley of California. He selected its name and names of many of its peaks and waterfalls, and left behind a vivid account of this natural wonder, its discovery and its original inhabitants.

He was born in Rochester, New York in 1824. When he was nine years of age, his physician father moved the family to the Michigan Territory and settled in the little French-Indian trading village of Detroit. His mother's cousin, Douglas Houghton, M.D., was a practicing physician in Detroit and a botanist, explorer and geologist of note. Bunnell grew up among the Chippewa Indians, learning to hunt and fish, swim, skate and fight with them and to speak their tongue. After a few years of elementary education, he worked for sometime in a drug store and then somewhat against his own will, went into his father's office. It is said that he attended private clinics and demonstrations. He soon found books and routine office chores confining and boring. From intimate acquaintance with French and Indian traders, soldiers and frontiersmen, he became infected with the romantic notion of going West.

His first westward venture, when he was 16 or 17 years of age, was with an older brother,

Willard, on a trip to the upper Mississippi Valley. Here, near the present site of La Crosse, Wisconsin, he engaged in fishing and lumbering for two years. He became interested in the Winnebago Indians of the area and learned their language and also learned much of the fauna and flora, natural history and geography of the area, which he related some years later in his book on Winona County. He returned to Detroit after several years, and recommenced the study of medicine as a preceptee of a Dr. Scoville. In 1846 Bunnell served in the Mexican War as a hospital steward and for a brief time, was in charge of a field hospital.

He was captivated by the news of the discovery of gold in California and traveled overland from Mexico to Mariposa, California, in 1849. It is assumed that he staked out claims and worked in



L. H. Bunnell

Fig. 1—Frontispiece of L. H. Bunnell. (1490 Bunnell, L. H. Discovery of the Yosemite. Chicago, 1880. Reproduced by permission of The Huntington Library, San Marino, California.)

Los Angeles, California.
See editorial, page 44.

the gold fields.

In 1851 Bunnell became a member of the Mariposa Battalion, a vigilante group of about 200 organized by the United States Indian Commissioner to subdue marauding Indians. Historians of this period indicate that this action was "necessary" because of the numerous Indian "depredations" on miners and settlers. Viewed from a century's vantage point, it seems probable that the California Indians, a generally timid and peaceful group, were more frequently victims than aggressors in their dealings with the white interlopers. Most San Joaquin Valley Indians were rather easily persuaded by the Mariposa Battalion to come onto a reservation near Fresno on threat of death and the destruction of all their property. However, the Grizzly Bear or Yosemite Tribe which came down from a mountain stronghold on a few occasions to attack farms and trading posts was not so submissive. Therefore, in the Spring of 1851 Indian runners were sent out from the battalion's encampment on the south fork of the Merced River to tell the Yosemite Indians that, if they would come in and make a treaty with the Indian Commissioner, they would be furnished with food and clothing, but if they did not, war would be declared and they would all be annihilated. The old Chief of the Yosemite Indians, Tenaya, answered this ultimatum in person. He declared to Major Savage, the head of the Battalion:

"My people do not want anything from the

Great White Father you tell me about. The Great Spirit is our father and has supplied us with all we need. We do not want anything from the white man. Our squaws are able to do our work."

Although wishing to spurn this federal patrimony, Tenaya was convinced from previous experience that his people would indeed be destroyed by the Mariposa Battalion. He, therefore, returned to the mountains and, in a few days, led in a motley band of only 72 men, women and children. He stated that the remainder of the band, probably no more than 125, had fled over the mountains to the East to join the Mono or Tuolumne Tribes.

Major Savage, who did not believe the old Chief, decided to enter the mountain stronghold and round up the rest of the tribe. Ascending the Sierra Nevada by the old Mariposa Trail, the Battalion reached what is now known as Inspiration Point whence the magnificent valley with its majestic enclosing cliffs comes into full view. This sight was as overpowering to Bunnell as it has been to countless others since. He wrote:

"None but those who have visited this wonderful valley can imagine the feelings with which I looked upon the view which was here presented. The grandeur of the scene was softened by the haze which hung over the valley, light as gossamer and by clouds which partially obscured the higher cliffs and mountains. This obscurity of vision increased the awe with which I beheld it and as I looked, a peculiar exalted sensation seemed to fill my whole being and I found my eyes in tears with emotion . . . It seemed to me that I had entered



Fig. 2—General View of the Yosemite Valley. (352554 Hutchings, J. M. *Scenes of Wonder and Curiosity in California*. New York, 1870. Reproduced by permission of *The Huntington Library, San Marino, California*.)

God's holiest temple. There was assembled all that was most divine in material creation. For days afterward, I could think only of the magnificence, beauty and grace of the waterfalls and the mountain scenery; and almost total lack of appreciation of that on the part of Major Savage caused me to think him utterly void of sentiment."

After the Battalion had pitched camp, Bunnell decided a name should be given the valley. Names were proposed by members of the group, but none were suitable. Bunnell suggested that it would be most fitting to name the valley for the Indians who had lived there and were now being driven out. The name Yosemite was unanimously adopted. During the next three months, the Battalion explored the valley and many of its canyons but found few Indians. They did discover large caches of food, principally acorns, the staple of the Indian diet, and destroyed them. Bunnell learned much of the Yosemite's history, arts and crafts and especially their skill in basket weaving. He described their diet and methods of cooking and observed their sweat houses and burial customs. He learned that every peak, cliff, canyon, meadow, stream and valley had a distinctive name and made a considerable effort to record these in their native purity.

"I applied myself perseveringly to the task of preserving these names, for even at an early date, I realized that public interest would be attached to this wonderful locality. I was ridiculed for the idea, or at least for the supposition that it would, probably be awakened during my lifetime."

Many of the Indian names such as Too-lool-lo-weack for Nevada Falls, were overlong and clumsy and for these he suggested English equivalents or other appropriate names. Among those which he selected and which are still used are Yosemite, Nevada, and Vernal Falls; El Capitan, Half Dome, and Mirror Lake.

When the Mariposa Battalion was deactivated later in 1851, Dr. Bunnell remained in California for five years trading, mining and surveying. He

then returned to the East. He served in the Civil War, entering as a private and, through successive promotions, reaching the rank of Major. His appointment as a commissioned officer became possible after an honorary degree of medicine was conferred on him by the La Crosse Medical College, a short-lived institution.

After the war, he settled in Homer, Minnesota which had been founded by his brother, Willard, and named after his birthplace, Homer, New York. In contrast with the high adventure of his early years, the remaining three decades of his life were prosaic. It is known that he practiced medicine and was a student of botany and science. He contributed to the first history of Winona County written in 1883. As historian for the Winona County Settler's Association, he published "*Winona and Its Environs on the Mississippi in Modern and Ancient Days*," a volume of nearly seven hundred pages. He also contributed historical articles to newspapers and magazines. His most significant writing was *Discovery of the Yosemite*, which was first published in 1880 and which went through four editions, the last published posthumously in 1911. This is a lucid and fascinating account of his explorations and observations in the great valley, written nearly 30 years after the discovery.

An interesting footnote is that one of Bunnell's admirers was the renowned Johns Hopkins' gynecologist, Dr. Howard Kelly whose contention was that Dr. Bunnell should be considered the true discoverer of the Yosemite Valley:

"... he alone of the little group that entered on a punitive expedition went eager and thrilled with the zest of discovery. He fully appreciated the opportunity and was filled with a sense of mystery. His companions were impassive and unimpressed, while he was exulting in the glories that unfolded before them; he became its baptismal sponsor and gave the valley its euphonious name, and later wrote about it in a never-failing spirit of enthusiasm."

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In serious gram-negative infections*

Simplified dosage guidelines

Usual adult dosage - - I.M. and I.V. - - in patients with normal renal function

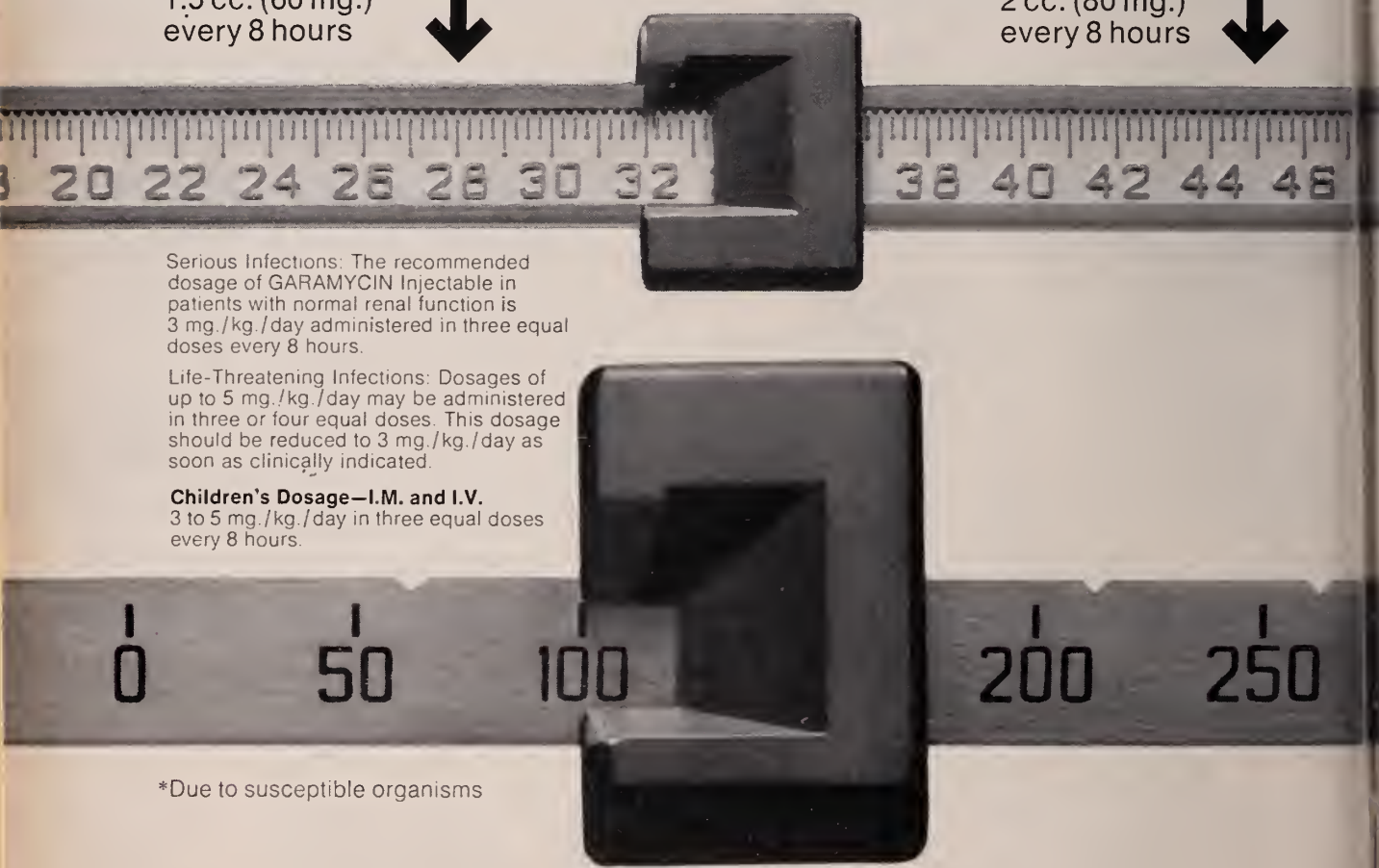
132 lbs. or less

1.5 cc. (60 mg.)
every 8 hours



Over 132 lbs.

2 cc. (80 mg.)
every 8 hours



Serious Infections: The recommended dosage of GARAMYCIN Injectable in patients with normal renal function is 3 mg./kg./day administered in three equal doses every 8 hours.

Life-Threatening Infections: Dosages of up to 5 mg./kg./day may be administered in three or four equal doses. This dosage should be reduced to 3 mg./kg./day as soon as clinically indicated.

Children's Dosage—I.M. and I.V.

3 to 5 mg./kg./day in three equal doses every 8 hours.

*Due to susceptible organisms

WARNING

Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug.

Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal damage, treated with GARAMYCIN Injectable, usually for longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment.

Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at onset of therapy who develop evidence of nitrogen retention (increasing BUN, NPN,

creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments or discontinuance of the drug.

In event of overdose or toxic reaction peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, should be avoided.

Garamycin[®]

gentamicin sulfate

injectable

I.M./I.V.

40 mg. per cc.

Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin

Schering

Duration of therapy—I.M. and I.V.

The usual duration of treatment is 7 to 10 days. In difficult and complicated infections, a longer course of therapy may be necessary.

Instructions for I.V. use

Dilution—A single dose is diluted in 100 or 200 cc. of sterile normal saline or in a sterile solution of dextrose 5% in water; in infants and children, the volume of diluent should be less. The concentration of gentamicin in solution should not exceed 1 mg./cc. (0.1%).

Infusion time—The solution is infused over a period of 1 to 2 hours.

Premixing—GARAMYCIN Injectable should not be physically premixed with other drugs but should be administered separately in accordance with the recommended route of administration and dosage schedule.

In adults with impaired renal function

The single dose of GARAMYCIN Injectable given by patient weight remains the same; however, the interval between doses must be extended.

This interval may be approximated by multiplying the serum creatinine by eight as follows:

$$\text{Serum creatinine} \times 8 = \text{frequency of administration} \\ (\text{mg./100 ml.}) \quad (\text{in hours})$$

This dosage schedule is not intended as a rigid recommendation, but is provided as a guide to dosage when the measurement of gentamicin serum levels is not feasible.

See Clinical Considerations section which follows...

neomycin, kanamycin, cephaloridine, in, polymyxin B, and polymyxin E n), should be avoided. Concurrent use of gentamicin with po- retics should be avoided, since certain cs by themselves may cause ototoxic- addition, when administered intrave- diuretics may cause a rise in gentami- um level and potentiate neurotoxicity. E IN PREGNANCY Safety for use nancy has not been established.

Garamycin® Injectable
brand of gentamicin sulfate U.S.P., injection, 40 mg./cc.
Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin
For Parenteral Administration

WARNING: Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug.

Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal damage, treated with GARAMYCIN Injectable, usually for longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment.

Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at onset of therapy who develop evidence of nitrogen retention (increasing BUN, NPN, creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, neomycin, kanamycin, cephaloridine, viomycin, polymyxin B, and polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent diuretics should be avoided, since certain diuretics by themselves may cause toxicity. In addition, when administered intravenously, diuretics may cause a rise in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy has not been established.

INDICATIONS GARAMYCIN Injectable is indicated, with due regard for relative toxicity of antibiotics, in the treatment of serious infections caused by susceptible strains of the following microorganisms:

Pseudomonas aeruginosa, *Proteus* species (indole-positive and indole-negative), *Escherichia coli* and *Klebsiella-Enterobacter-Serratia* species.

Clinical studies have shown GARAMYCIN Injectable to be effective in septicemia and serious infections of the central nervous system (meningitis), urinary tract, respiratory tract, gastrointestinal tract, skin and soft tissue (including burns).

Bacteriologic tests to determine the causative organisms and their susceptibility to gentamicin should be performed.

Bacterial resistance to gentamicin develops slowly in stepwise fashion; there have been no one-step mutations to high resistance.

In suspected or documented gram-negative sepsis, GARAMYCIN may be considered as initial therapy. The decision to continue therapy with this drug should be based on the results of susceptibility tests, the severity of the infection, and the important additional concepts contained in the Warning Box. In the neonate with suspected sepsis or staphylococcal pneumonia, a penicillin type drug is usually indicated as concomitant antimicrobial therapy.

GARAMYCIN Injectable has been shown to be effective in serious staphylococcal infections. It may be considered in those infections when penicillins or other less potentially toxic drugs are contraindicated and bacterial susceptibility testing and clinical judgment indicate its use.

CONTRAINDICATIONS A history of hypersensitivity to gentamicin is a contraindication to its use.

WARNINGS See Warning Box.

PRECAUTIONS Neuromuscular blockade and respiratory paralysis have been reported in the cat receiving high doses (40 mg./kg.) of gentamicin. The possibility of these phenomena occurring in man should be considered if gentamicin is administered to patients receiving neuromuscular blocking agents such as succinylcholine and tubocurarine.

Treatment with gentamicin may result in overgrowth of nonsusceptible

organisms. If this occurs, appropriate therapy is indicated.

ADVERSE REACTIONS

Nephrotoxicity: Adverse renal effects, as demonstrated by rising BUN, NPN, serum creatinine and oliguria, have been reported. They occur more frequently in patients with a history of renal impairment treated with longer than recommended dosage.

Neurotoxicity: Adverse effects on both vestibular and auditory branches of the eighth nerve have been reported in patients on high dosage and/or prolonged therapy. Symptoms include dizziness, vertigo, tinnitus, roaring in the ears and hearing loss.

Numbness, skin tingling, muscle twitching, and convulsions have also been reported.

Note: The risk of toxic reactions is low in patients with normal renal function who do not receive GARAMYCIN Injectable at higher doses or for longer periods of time than recommended.

Other reported adverse reactions, possibly related to gentamicin, include increased serum transaminase (SGOT, SGPT), increased serum bilirubin, transient hepatomegaly, decreased serum calcium; splenomegaly, anemia, increased and decreased reticulocyte counts, granulocytopenia, thrombocytopenia, purpura; fever, rash, itching, urticaria, generalized burning, joint pain, laryngeal edema; nausea, vomiting, headache, increased salivation, lethargy and decreased appetite, weight loss, pulmonary fibrosis, hypotension and hypertension.

DOSAGE AND ADMINISTRATION GARAMYCIN Injectable may be given intramuscularly or intravenously.

For Intramuscular Administration:
PATIENTS WITH NORMAL RENAL FUNCTION*

Adults: The recommended dosage for GARAMYCIN Injectable for patients with serious infections and normal renal function is 3 mg./kg./day, administered in three equal doses every 8 hours.

For patients weighing over 60 kg. (132 lb.), the usual dosage is 80 mg. (2 cc.) three times daily. For patients weighing 60 kg. (132 lb.) or less, the usual dose is 60 mg. (1.5 cc.) three times daily.

In patients with life-threatening infections, dosages up to 5 mg./kg./day may be administered in three or four equal doses. This dosage should be reduced to 3 mg./kg./day as soon as clinically indicated.

*In children and infants, the newborn, and patients with impaired renal function, dosage must be adjusted in accordance with instructions set forth in the Package Insert.

For Intravenous Administration:

The intravenous administration of GARAMYCIN Injectable is recommended in those circumstances when the intramuscular route is not feasible (e.g., patients in shock, with hematologic disorders, with severe burns, or with reduced muscle mass).

For intravenous administration, in adults, a single dose of GARAMYCIN Injectable may be diluted in 100 or 200 cc. of sterile normal saline or in a sterile solution of dextrose 5% in water; in infants and children, the volume of diluent should be less. The concentration of gentamicin in solution, in both instances should normally not exceed 1 mg./cc. (0.1%). The solution is infused over a period of 1 to 2 hours.

The recommended dose for intravenous administration is identical to that recommended for intramuscular use.

GARAMYCIN Injectable should not be physically pre-mixed with other drugs, but should be administered separately in accordance with the recommended route of administration and dosage schedule.

HOW SUPPLIED GARAMYCIN Injectable, 40 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

Also available, GARAMYCIN Pediatric Injectable, 10 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

APRIL, 1972
AHFS Category 8:12.28

For more complete prescribing details, consult Package Insert or Physicians' Desk Reference. Schering literature is also available from your Schering Representative or Professional Services Department, Schering Corporation, Kenilworth, New Jersey 07033.

SLR-192

Garamycin®
gentamicin
sulfate
Injectable
I.M./I.V.

40 mg. per cc.

Each cc. contains gentamicin
sulfate equivalent to 40 mg. gentamicin



Book Reviews

DEATH AND ATTITUDES TOWARD DEATH. Proceedings of a Symposium held at the University of Minnesota. Edited by Stacey B. Day. Bell Museum of Pathology. 1972. \$1.00.

We are engaged in a lifelong struggle with the enemy, death, yet rarely do we take time to examine our adversary. Stacey Day has assembled a varied group to discuss death: physicians, a nurse, philosophers (including a professor of political science), scientists and clergymen. It is fascinating reading. The Symposium discusses many problems about death that most physicians tend to ignore but are important to the patient and his family. For instance should a patient be allowed to go home to die in his own bed if that is his desire? How can a man end his existence in dignity in a hospital bed with his every orifice cannulated, his excretions soiling his linen? There is little dignity in a hospital bed nor can there be. Ladies and gentlemen become simply men and women when they don the hospital gown. Death is not beautiful, B. J. Kennedy to the contrary notwithstanding. But it is not the worst of evils and in the terminally ill with no hope of recovery especially in the presence of suffering it is the only surcease available. These Proceedings have been bodily lifted from the panel podium. The questions craftily put by Day and the varied answers are stimulating. But the format leads inevitably to problems that might have been solved by judicious editing. I submit the question: "Mulford Sibley have you anything to say," and the answer: "No"—adds nothing.

Death is a great sounding board for Day's poetic questions. John Brantner summed it all up discussing a child's conception of his own death (no different from most adults): It is inconceivable.

Rueben Berman, M.D.
Minneapolis, Minnesota

SYNOPSIS OF PATHOLOGY, 8th Edition, by W. A. C. Anderson & T. M. Scotti, C. V. Mosby Co. \$13.95.

If you want to know what is meant by a cystadenofibroma of the ovary, it's here, in four clear, concise lines. Other subjects are treated similarly, sometimes at greater length, and often with nicely selected illustrations of gross and microscopic pathologic material. Despite its 1076 pages, the book is small, and in this age of bigger being equated with better, it is refreshing to see

that less can be best. This book may be the best for many phases of student teaching, and for practitioners who remove tissue and want a quick reference to round out knowledge of a disease process, since it covers more than surgical pathology. Recommended.

Robert L. Woodburn, M.D.
St. Paul, Minnesota

CURRENT PEDIATRIC DIAGNOSIS AND TREATMENT, Second Edition. Edited by C. H. Kempe, M.D., H. K. Silver, M.D., Donough O'Brian, M.D., F.R.C.P., et al. Pp 1008. Lange Medical Publishers, Los Altos, California, 1972. \$12.00.

The 7¼" x 10¼" x 1¼" size of this paperback precludes its use as a pocket reference. However, the effectiveness of presentation well offsets the disadvantage of bulkiness. It is the kind of volume that should be at fingertip as a quick reference resource on every pediatric hospital station, in clinics where children are being seen or in the young physician's office.

The sturdy construction should withstand average wear during the useful life implied by the little word "Current." On a busy pediatric station, replacement may be necessary before a newer edition is available.

Considering the large number of contributors, the editors are to be commended for the uniformly crisp, concise style found throughout the book. The comprehensive material is well indexed. The references listed at the end of each topic furnish a starting point for those who need to explore a subject in more detail. The generous sprinkling of tables adds to ready availability of information. These tables are well labeled and easily interpreted. Illustrations are used primarily to clarify diagnostic and therapeutic procedures.

One might take issue with some specifics of treatment which would need modification for individual cases. An experienced clinician has the background for making these adjustments which is not available to the novice who may tend to use this as a "cookbook." However, no book can be expected to compensate for all the foibles of human nature and the recommendations, in general, are good ones. I consider this book a very good buy in general pediatric resource material.

Martha Burke-Strickland, M.D.
Director of Newborn Services
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Adolescent Medicine

vol. 56 #

FEBRUARY 1973

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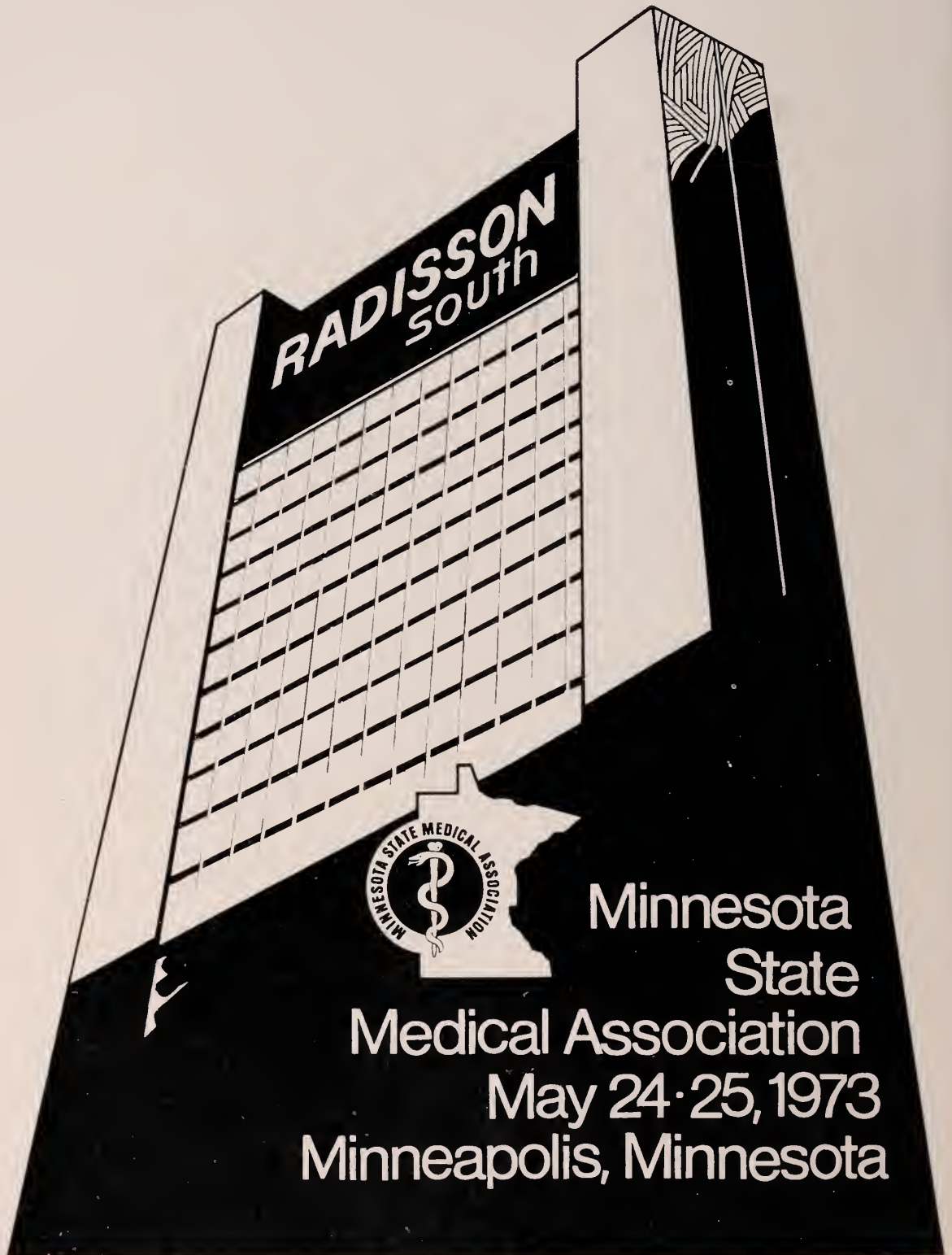
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President's Letter



Change of Life?

TWO OF THIS issue's excellent articles highlight for me very important facets of our lives today . . . the observation by Wallinga that the physician must show to his children that they are as important to their parent as his patients, and Westman's postulate that in our culture remembering the past and planning for the future are rewarded but living for the present is frowned upon.

These two concepts provide a matrix upon which the shifting patterns of adolescence may fall into place. The constancy of change during the teens; the pairing of opposite moods, ideas, actions, roles is painfully familiar to parents of young people.

Since our family's sudden passage into non-adolescent status, several revealing observations have occurred to me. I have been struck with the realization that many of my adult patients, friends, as well as people unknown to me except by media reports, are acting much in the same fashion as adolescents. They are unsure of their worth and trying to find or prove it, at the same time disregarding the past and future while hedonistically living in the present. The exaggerated prolongation of the "youth culture," the exhibitionistic dress and sensual fulfillment promoted by advertising and various pseudo-psycho-social cults and reported sensationally by the media seems juvenile to the traditionalist.

Could it be that the changing life of the adolescent will continue until the "change of life" with no adulthood separating them? Hopefully no.

Continued searching for self coupled with present orientation is mandatory to prevent the stasis of cerebral lethargy and emotional barrenness. Perhaps if more teenagers can be adolescents, more of them will come to remember the past, plan for the future and be discerning enough to realize that we live now in the present. Perhaps they will allow their lives to change and thereby enrich ours.

George B. Martin

President
Minnesota State Medical Association



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The Physician and His Adolescent

JACK V. WALLINGA, M.D.

ESSENTIAL IN dealing with any adolescent, particularly one's own, is to retain a sense of humor. Adolescence may be considered as the last of the common childhood diseases, from which most individuals recover spontaneously but occasionally it evolves into a chronic illness from which recovery is slow. Parents might best stand aside and let the teenager go through adolescence with a maximum of understanding and a minimum of advice. Anna Freud¹ observed that it seems easier, where adolescence is concerned, to describe the pathologic manifestations than the normal processes. She emphasized that adolescence, by its very nature, is an interruption of peaceful growth and a steady equilibrium of personality *is in itself abnormal* during this period. Once we accept the basic fact of adolescent disharmony within the psychic structure, understanding of teenagers and their problems is easier.

We need a rational basis for our behavior in dealing with adolescents, so we must strive for understanding of the adolescent process. Typically adolescents are often erratic, contradictory, egoistic and calculating, but at the same time, idealistic, generous, artistic and unselfish; perhaps more than they will ever be again. They fight their impulses, and they accept them. They love their parents, and they hate them; they revolt but still wish to be dependent. They thrive on the imitation of others while searching unceasingly for their own identity. It's not surprising that we are confused in trying to understand adolescents since they are so confused themselves. Some don't confide in their parents at all. This can be their normal self, but it is perturbing to the physician who is accustomed to people confiding in him and seeking his counsel.

Rebellion belongs to the freedom we have given our children by bringing them up in such a way that they exist in their own right.² By the time adolescence is reached, parents can only help a

little. The best they can do is to survive, to survive intact and without changing or relinquishing any of their own important principles. Parents may themselves grow along with their youngster's adolescent struggles. Ideally, the child enters adolescence at puberty in a state of uncertainty, facing difficulties and serious emotional conflicts, and then emerges from it, finally, with a stable socially acceptable adult pattern. The adolescent who does not experiment and who settles on a specific personality structure too quickly may not allow for the emergence, ultimately, of a healthy adult personality structure. During adolescence they may need to prove their dominance or their sexual identity, their independence, their virility, their potency and these proving tasks may become obscured by long hair, tight trousers, pierced ears, beards, mustaches and other bizarre manifestations of physical appearance and dress; all of this in the same youngsters who are almost paranoid at times about anyone looking at them or joking about their appearance. It's as if to be self-defeating and self-destructive is a test they must undergo. Adolescent manifestations take various patterns. We may see compensating coping patterns of compulsive studying or physical meticulousness or, at the other extreme, dropping out, copping out, drug abuse, running away, abandoning goals and standards or possibly attacking the world with a pseudo-sociopathic facade of indifference, insensitivity, and amoral, conscienceless protest. Underneath the veneer, however, may be very frightened, sensitive, anxious, guilt-ridden feelings which are not allowed to show. Some withdraw into abstract, philosophical, ideological states; others disassociate and may resemble schizophrenia, but they certainly should not be treated as schizophrenic. Adolescents can be very receptive to treatment. Psychotherapeutic support is preferable to isolation from the family, evicting them from the home, or confining them in a psychiatric ward which adds to the feelings of detachment, alienation and abandonment that are so overwhelmingly threatening to them.

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Expressive

Adolescents are sometimes not verbal, but they are almost always expressive. Good communication with adolescents is primarily listening and closely observing with understanding. Lecturing, advising or criticizing either as a doctor or a parent, is rejected and quickly disrupts communication. Adolescents seek respect above everything else and, at times, respect for their desire for emotional distance and personal independence. Hair can be very effective to hide behind and for this the long hair styles are much more useful than short hair. The appearance of adolescent's rooms often reflects the chaos and confusion that they feel inwardly. Appropriateness of clothing as well as the feeling tone reflected are both important. The boy dressing in feminine colors may reveal his uncertainty about his masculine role; the rebellious, aggressive teenager proclaims his feelings with blaring reds and garish fashions while a withdrawn, hesitant youngster in bland beige or white expresses his uncertainty. Depression may show in black, drab, somber clothing. Overneatness and fussiness of clothes, hairstyle and bearing typify the adolescent who is handling his inner tensions through rigid compulsiveness and a lack of emotional flexibility. Baggy, formless clothes may deny and conceal sexual identity and maturity. Other teenagers announce their sexual urges to the world with clothes that are revealingly tight and exposing.³ The writings, the poetry, stories, diaries as well as pictures, choice of books, records and posters and youngster's reactions to music and lyrics are all revealing. Most adolescents are willing to talk, but only to those who are able and willing to listen to them. The physician-parent, as one who is listened to all day with deference and respect, cannot expect the same attitude from his own teenagers. His youngsters are quickly turned off by his expertise and experience which his patients gratefully pay to receive from him.

Depression

Depression is almost endemic for adolescents. Anna Freud observed that a strong fixation to the mother, dating from an early pre-Oedipal attachment to her, makes adolescence especially difficult to pass through. When the physician-father has been pre-occupied with his work and not sufficiently involved with the children, the dependency on the mother is intensified, hindering the youngster's ability to release anger directed toward the

parents and interfering with liberation from parental dependence. Adolescents need crises to differentiate themselves from their parents. Differentiation is more difficult when parents are psychologically sophisticated and are always agreeable and permissive with their adolescents, preventing crisis differentiation. Thus, some friction and some disagreement in a family is normal and very healthy, albeit disruptive.

Admitting to depression may be difficult for adolescents and a facade of clowning or pseudo-happiness is presented instead. Some youngsters stay up far into the night listening to records or the radio because they fear being alone or have insomnia. Restlessness, trouble concentrating, a decrease in school performance or obviously getting themselves expelled from school, dropping friends or previous activities or sports all may signal an underlying depression. Feelings of hopelessness, pessimism about the future, strong feelings of inadequacy, inferiority and a certainty of failure for their efforts are closer to the adult symptoms of depression. Irritability, boredom and lack of energy may lead to efforts to seek relief through drinking, drug abuse or sexual acting out. Some adolescents try all of these experiences in the search for relief and the pattern may spread to a broader delinquent behavioral spectrum. The sexual acting out, particularly, is an effort to gain closeness but, when guilt is created instead, there is further feeling of isolation and a vicious cycle is reinforced. Risks, and accident proneness are a more subtle aspect of the same dilemma. Some of the accidental deaths, particularly in automobiles, have a strong suicidal component. Suicide, one of the highest ranking causes of death in the 15 to 19 year age group, is reported increasing.

Drug Usage

Drug usage is particularly an area where understanding rather than angry, threatening lecturing is needed. Most adolescents try drugs experimentally and do not go on to heavy involvement or addiction. If youngsters are maintaining adequate academic, peer and recreational interests, more likely drug use is an aspect of healthy adolescent curiosity than in adolescents who are dropping out of their normal activities and compromising their emotional development by drug usage. Sometimes drug use wards off suicidal impulses and thus maybe temporarily even helpful. Parents

can better try to understand why children need to take drugs and then help them find healthier ways of meeting their needs than to become involved in undue surveillance, threatening or punishment. Physicians are, to the young people, the original "pushers" who prescribe pills (unnecessarily?) for relief of a multitude of subjective problems by chemical panaceas. The drugs that youngsters often first start abusing are their parent's, readily available in the medicine cabinet. Physicians need to be especially careful with drug samples in the home.

Physician-Parent

Physicians, with often compulsive strivings, perfectionistic personalities and great dedication and achievement, may seem high on pedestals, far out of reach and communication to their children. They tend to expect more of their children, or the youngsters expect more of themselves, because of

the standards set for them simply by the parent's life style. Parental affection for them and concern about them are often misinterpreted as only mistrust and lack of confidence in them.

The physician's success—academically, financially and socially—often is seen by his own adolescents as an insurmountable obstacle. Their basic insecurity and uncertainty does not allow them to imagine that they might reach the same heights or go even further. The physician's load of responsibility and the demands of his profession may not be goals to which his children can aspire. It is extremely important to separate and differentiate the doctor role from the father role, particularly when offering counsel to one's children.

The physician-parent is extremely busy with very important work—other people's lives. His adolescents need to clearly know that they are just as important.

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Friedman-Roy Syndrome

This eponym is proposed for a hitherto unnamed group of central nervous system manifestations that include feeble-mindedness, motor symptoms, and reflex changes. The combination of findings described by Friedman and Roy as "an unusual familial syndrome" occurred in six siblings, whose parents were cousins and of average intelligence. An aunt was feeble-minded and had convulsions.

The chronologic age of the children ranged from seven to 17 years, but in no instance did the mental age exceed three years. Motor symptoms included speech defects and disturbances of extraocular movements including strabismus. Also present were extensor plantar reflexes and bony deformity of the feet (clubfoot). There was no evidence of progression, but no improvement occurred. The mother had internal strabismus and a positive Oppenheim reflex. Electroencephalograms of the mother and children revealed a striking similarity with uniform tendency toward high voltage and irregular frequency. Because of the reported absence of similar findings in antecedents, a classification with the usual heredofamilial syndromes is not possible.

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*Sorrows draw not the dead to life, but the living to death.**

*Sir Walter Raleigh, to Robert Cecil on the death of Cecil's wife, 1597.

Understanding Teenagers

JACK C. WESTMAN, M.D.

THE AMBIGUITY OF adolescence is well known. When a child becomes an adult concerns not only the youngster, but also the pediatrician and internist in defining the age boundaries of their practices, state legislatures in establishing eligibility for adult privileges, and parents in their continual review of the ability of their growing child to assume responsibility for himself. All of this is compounded by the fact that adolescence submits to generalization no more readily than any other age span in life. Each teenager is a unique individual with his own particular assets and liabilities.

A feature of the adolescent years is that a few months or a year can make a significant difference in the developmental level of an individual. We pay little attention to whether or not an adult patient is 30, 35 or 40. There is a great difference, however, between a 13-year-old and a 17-year-old, years of change and variability. This accelerated change, coupled with transition from childhood to adulthood, is responsible for common misunderstandings of youth.

Adolescents Are Growing Up to be Something

One of the illusions confronting youngsters, and shared by adults, is the belief that young people are growing up to be something. This view holds that childhood and adolescence are preparatory to something later in life. As a result simply being a four-year-old, ten-year-old, or 15-year-old is seen as an incomplete existence. Young people, according to this view, are working toward something that will come later. A resulting attitude is that if one works hard and waits, life will become better. Built into this attitude is also the notion that to live for the moment is psychopathic or, at least, immature. The implication is that normal people do not live for the present. Planning for the future and remembering the past are rewarded; but living in the present is frowned upon. As a result, life for many teenagers seems to have the

flavor, "If I can just get through these years, I'll find my real self and real living later."

Teenagers are driven by strong desires to live their present lives fully. This fact brings them into conflict with the belief that their lives are incomplete and that fulfillment should be deferred. A past-future cultural orientation is thrust upon adolescents, who can intellectually contemplate the past and the future, but whose strivings are oriented toward the moment.

Heightened Sensory and Sensual Sensitivity

The progressive maturation of the central nervous system through the teenage years is reflected in keenly felt sensitivity to perceptions, ideas, impulses and urges. This heightened awareness of the world and of themselves is expressed through teenagers' thoughtful, sensitive concern for themselves and others—at moments.

The exquisite insight of adolescence is illustrated by a 15-year-old girl who listened to a discussion of how youngsters become delinquent. During the discussion the point was made that delinquents often come from homes in which there was too little, or too much, love. The implication was that the parents of delinquents either neglected their children or put them on pedestals. The point was made that some mothers overindulge their sons, leading them to have little respect for the wishes of others. This 15-year-old girl challenged the point that delinquency could arise from too much love. She said, "I think that a mother who smothers her child with 'love' and puts the child on a pedestal really doesn't love him—only herself."

Together with heightened sensory and intellectual sensitivity, the body image in the parietal cortex also undergoes change and develops a more sophisticated representation of the body. As is known from the neurological study of rapid changes in body conformation, such as with the amputation of a limb, the body image requires time to adapt to change. With the rapid growth of the adolescent's body, discrepancies exist between the body image and the actual structure of

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See editorial, page 135.

he body. This adds a possible neurological component to the adolescent's psychological reaction to his rapid body growth. At times, his body "doesn't feel right." Some of the adolescent boy or girl's time in front of the mirror is related to narcissistic self-admiration, however, some is also related to the youngster's attempt to become acquainted with the "feel" of his changing body structure. A boy admiring his physique in front of the mirror is not only testing his power, but also new sensations. The girl combing her hair at length before a mirror is not only preening, but also becoming familiar with herself. The discrepancy between the actual body structure and body image contributes to the strangeness and the discovery of the adolescent years.

The primary and secondary sexual changes occurring as a result of augmented male and female sex hormones are well known, however, the gradual response of target organs and the reaction of the body to the increase in these powerful agents has been overlooked. This increase in glandular activity, in part, is responsible for mood swings, dizziness, embarrassing ease of blushing and other autonomic responses that result as the body adjusts not only to advancing central nervous system maturation but also to new levels of hormone activity.

All of these physical changes during the teenage years contribute to the adolescent's need to accommodate to an ever-changing picture of himself and the world.

Trends during the Adolescent Years

Although the onset and termination of puberty is determined by physical growth, adolescence itself begins with the onset of puberty but ends as defined by cultural and social considerations. This means that adolescence may be a brief period in a primitive society beginning with the onset of puberty and ending with the pubertal rite of circumcision at which point the individual becomes a member of adult society. At the other extreme, in urbanized societies the end of adolescence may be deferred until the third or fourth decade of life until adult responsibility are formally assumed. Increasingly in the United States, adolescence tends to fade away.

For the middle-class American, adolescence can be conveniently divided into three periods: early adolescence (ages 13 and 14), middle adolescence (ages 15 and 16), and late adolescence (17 and

18). There are significant differences during these years posing characteristic developmental issues.

The early adolescent is pre-occupied with accommodating to bodily changes and sensations. It is during this time that the youngster becomes aware of smells, views and sounds that held little interest during earlier years. Inhaling odors on the walk to school can lead a teenager to dawdle. The experience of sexual urges leading to affectionate feelings present the early adolescent boy and girl with hitherto unknown, embarrassing and exhilarating sensations. As an illustration, a 14-year-old boy may be largely preoccupied during a class in school with fighting off sexual arousal. His teacher may assume that he lacks interest in the class, being unaware of the more pressing matter—the boy's fear that when he stands up his erection will show. A 14-year-old girl may be distracted in school by the color of her teacher's eyes. Her teacher may be totally unaware of the reason for her apparent interest in social sciences. Learning to live with and cope with sensations and emotions is a vital part of all teenage years, but particularly during early adolescence.

"Trying on" Personalities

As fourteen blends into fifteen and then sixteen, the interests of youngsters move beyond their own bodies to exploring relationships with other people. At times boys and girls may be thrust prematurely into sexual encounters before they have had an opportunity to become fully familiar with their own bodies and explore feelings and ideas about themselves. A problem for today's adolescent is that his social environment tends to force him into sexual activity, depriving him of the opportunity to gradually become acquainted with himself and others. Many middle adolescents assume a pseudomature stance, acting like "swingers" in an effort to shed the trappings of childhood. Some of this is subtly encouraged by parents who promote dating and mating.

From the developmental point of view, the middle adolescent is attempting to discover both himself and others. Socializing for him is less a sexual activity and more a way of "trying on" personalities. Depending on one's socio-economic and cultural position, dating can assume many shapes and forms. Most boys date girls in the traditional sense, however, in many urban areas dating is being replaced by group activities and informal arrangements between the sexes. In

general girls feel increased freedom to take the initiative with boys.

In addition to the social pressures many teenagers feel toward early and active sexual relationships, the affects of over-population and urbanization are contributing to the decline in gradual exploration and experimentation with members of the opposite sex. Youngsters living in urban areas find themselves deprived of neighborhood and school-based peer support as is still available in smaller communities. The result is that the typical urban adolescent is more "at sea" in validating his identity with other teenagers upon whom he can depend. One of the most important aspects of role experimentation is having dependable feedback. With increasing changes in schools and neighborhoods and the large size of secondary schools, it is becoming more difficult for the adolescent to find reference groups who will "stick with him." On the positive side, the wider range of social contacts for the middle adolescent leads to greater comfort in strange situations and reduces inordinate dependency upon the familiar. In general, our middle adolescents find themselves more comfortable in new situations and are less inhibited in expressing their needs and carrying out plans for themselves. On the negative side, urbanization has deprived the adolescent of the needed support and familiar ties that can tide him over the vicissitudes of growing up.

Urbanization has also contributed to wider sexual experimentation in that many young people are reluctant to become involved sexually with acquaintances. These adolescents will have sexual relations, however, with strangers or people who are not known to their families. It is this seduction into early sexual activity based upon the relative lack of fear of repercussions that poses definite problems for the development of each adolescent. Ideally a teenager gradually first becomes familiar with his own body and its sexual capabilities and then transfers these sensations and feelings to other persons.

To the surprise of many adults who have forgotten their own adolescence, interaction between adolescent boys and girls is much more at the social than at the sexual level. Boys and girls use each other to find out what they are and how they would like to be. Their experimentation may include periods of minor antisocial behavior. They try on various roles: acting too old, young, "tough," debonair, or coarse. This role experi-

mentation resembles the peacock strutting and fanning his feathers and casually, but intently, observing the result. During this time a youngster may rise to the full height of oratory and produce resounding ideas, exercising to the fullest her newly attained intellectual skills. At a later moment, the girl, who is the lead in her class play, cannot attend practice because she has locked herself in her room at home. Families are acutely aware of the "crazy" behavior of the adolescent, a side ordinarily not displayed at school or in the neighborhood. A healthy respect for the role experimentation of the adolescent is in order. Being too frank with a teenager who is trying a role on for size does not take into account the developmental aspect of his behavior. If a teenager is clearly "playing a role" and is challenged by the question, "Is this really you?" she may bust into tears and vent her wrath. From her point-of-view, and in reality, experimenting with roles is her real self.

High School Senior—College Freshman

Late adolescence flowers during the senior year of high school and the succeeding year or two. If college is involved, decision making is deferred, however, the central issue is settling on one's identity. Although an exceedingly complex concept, simply stated, identity is everything subsumed by one's name. In other words, Bill Smith's identity is reflected in everything that comes to mind as one thinks of Bill Smith. Following experimentation with a number of ways of behaving and feeling, the late adolescent concentrates on "being me." Although associated with career choice, a solid sense of one's being permits a deeper level of relationship with others, leading to the capacity for commitment to goals and other people. The late adolescent depends upon feedback from others in order to give him a clear sense of his assets and liabilities.

For the successful adolescent in our society, the attainment of a well-defined identity and awareness of one's value of life grows. But for a young person who isn't successful in externally obvious and comparative ways, a sense of self-identity comes with difficulty. Young people are in the throes of painful recognition that a sizeable proportion of the population is frankly disadvantaged and that the majority lack the talents and gifts required for positions of leadership. In one school class there may be a few A, many B and C and a

few D students. The amorphous middle majority is awakening, however, and taking a more visible and powerful form. Labor unions have legitimized the identity and dignity of working men and women. Long weekends and vacation travel are no longer the domain of the wealthy. In fact, the largess of the rich is rapidly being absorbed by an affluent middle-class.

We are witnessing the rapid demise of a value that has been implicit in our social system, namely that people are rank ordered according to their wealth and their productivity. Although the clearly defined social classes of the past provided external knowledge of "one's place," that system prevented the individual from gaining a sense of importance and adequacy. What has it been like for Bill Smith, the C student, the fellow who can't play football well, the boy with little distinguishable talent, the boy who is just Bill Smith? Bill Smith's chances are better today. We are moving into the age of the "common man" in that differences between people are becoming less likely to be determinants of their human rights and opportunities—and their self-esteem.

To Err is Bad, but Getting Caught is Worse

The need to classify and evaluate people persistently arises for practical reasons. We are reaping, however, the long range impact of processing youngsters through an evaluation system that clearly defines the "good" student as distinct from the "poor" student. Our attitude towards learning has imparted to youngsters the idea that it is wrong or "bad" to make mistakes. We have led our children to assume that the expected and desired thing is to be correct, whether it be in knowledge or actions. In some instances children show what might be regarded as an "error-phobia." As a result some youngsters give up and become under-achievers. Why should they try? They will only end up with Cs. "If I can't be the best, why try?" Other youngsters resort to cheating, reasoning that it is better to conceal mistakes than to admit error.

A 13-year-old boy was asked to define stealing. He said, "Stealing is when you take something and get caught." When asked, "What do you call taking something without being caught?" the boy replied, "That's not stealing." The boy's attitude was clear—one is concerned first about appearances. If "bad" behavior shows to others, there is a problem. If not, there is no problem.

Communicating with Adolescents

In spite of their improved position today, adolescents still have difficulty being themselves and living their age fully. As previously indicated, our society does little to recognize the legitimacy of childhood and adolescence. Although drinking fountains are lowered and smaller desks provided, it is the unusual school system that successfully relates itself to the inner life of young people. Surprisingly, many teachers are unable to talk with young people. We frequently find today that teachers, nurses and physicians call upon the child psychiatrist to help them learn how to converse with the young. It is a stark fact that people who devote their professional lives to working with children are only now facing the simple question, "How can we find out what young people are thinking?" We are only beginning to see barriers break down and dialogue emerge between generations.

One of the pitfalls for adults in approaching younger people is the hope that it is possible to really completely understand adolescents and convert them to adult ways. The psychiatrist frequently encounters parents who say, "We want to get to know our 15-year-old girl; we feel we are losing her; and we want her to be free to say anything that she wishes to us." The parent who talks about establishing a close relationship with an adolescent is fighting the growth process. He runs counter to the burgeoning independence of the teenager. From birth onward, children grow away from adults at a rate that accelerates during the adolescent years. We often are inclined to overlook the necessary and useful distance between generations.

In the Adolescent's Shoes

One way to put ourselves in our teenager's shoes is to recall our own adolescent days. Those of us who are presently middle-aged didn't worry much about how our fathers felt about the Depression or World War II. We didn't worry much then about what our mother was doing to further community action. It is doubtful that we worried very much about whether our parents smoked or drank too much. On these points times have changed: these are real concerns for teenagers today. Advances in education and television have placed today's teenagers in a more sophisticated and socially aware position than was true in the past.

We may worry about our teenagers now, however, in many instances they are more worried about us. On the other hand, it is reassuring to recall that we did not show much direct gratitude toward our own parents when we were young. In fact we were much like present teenagers in lavishing criticism and withholding praise.

Many adults today feel with some justification that young people have too much freedom and not enough responsibility. This view may be tempered by the expectation that tomorrow they will join the stodgy middle class. The fact is that our present adult generation is a far cry from that of our parents. We did not become like them. In a similar way, our young people will not find their lives in our images. Social change has and will occur.

Adolescents Challenge Adults

The experience of the late sixties has taught us much about conflict that can arise between young people and older people. Cross-generation relations have often taken the form of battles. Many adults have become aware of the "threatening enemy" image of the teenager, a view which leads to instinctive recoil and suppression. On the other hand, there is a growing recognition that most adolescent protests are bids for recognition and challenges for adults to define their positions. Many teenagers despair because of the lack of sincerity and conviction of their parents, communities and teachers. As one girl put it, "When I push you, you give in like a marshmallow, or you crash down on me when it's unimportant. If I stay out late at night, you either overlook it or you ground me for a month."

A teenage delinquent boy referred to a psychiatrist because of auto-thefts illustrates how teenagers push us, hoping that we won't crumble.

After entering psychiatric treatment, the greatest evil in his life became his "lousy head-shrinker." During his appointments he complained that all that happened was talk. He insisted he did not need to see a psychiatrist because there was nothing wrong with him. One day he launched into a tirade, "I don't have to see you. I'm missing out on more important things. What do I have to talk to you about? I'm never coming back." At the end of the appointment time he repeated that he did not need help, but, as he was leaving, he asked without changing his expression, "When's my next appointment?" When told that the therapist would be gone for two weeks, he appeared crestfallen. When asked, "Do you think you can last that long?" he replied, "Well, I guess so." Suddenly the dependency and weakness that lay beneath his adolescent bravado were revealed.

Do We Really Want to Understand Teenagers?

Although it is clear that mature adults and the resources of society are devoted to the nurturance and welfare of our young, it is also true that we are both afraid of and threatened by young people. It is not pleasant for adults to be reminded of their weaknesses and to face the criticism of the young who see our faults so clearly. It is not pleasant for parents to witness the progressive growth of their children away from them. It is discouraging to accept the fact that our young people will no longer need adults, and one day may care for us. But of greatest importance is the obvious fact that one day the young will take the place of the older. It should be no surprise, then, that adults hold ambivalent feelings toward the young and that the potential for misunderstanding and mistrust abounds between generations.

A Biggen he had got about his braine,
For in his headpeace he felt a sore payne.
His hinder heele was wrapt in a clout,
For with great cold he had gotte the gout.*

*Edmund Spenser, "The Shepheardes Calender" (May), 1579.

Practical Aspects of Adolescent Growth and Development

W. A. DANIEL, JR., M.D.

ADOLESCENCE IS A PHENOMENON rather than a biologic period. Puberty is that part of adolescence associated with rapid growth and development and characterized by the ability to beget or bear children. It is unknown just what occurs in the body to start the secretion of specific hormones bringing about pubertal changes, but we do know that the time of onset occurs at different ages for different individuals with each child having a specific velocity of change but all progressing in the same sequential pattern. There are objective milestones of physical maturation that the physician can use in following the growth and development of adolescent patients and these important stages are related to many conditions seen in office or hospital practice. A five-stage scale of evaluation has been developed by Tanner¹ and is used by most physicians caring for large numbers of adolescents. These characteristics are listed in Tables

1 and 2.

The above concept is based upon the relationship of body changes to the stages of maturity, not necessarily to age. This means that many developmental alterations occur at specific maturational stages and not at particular chronological periods. In our clinic the mean hematocrit for a boy of any age at Stage 4 is 42.25, and is 39.6 for Stage 2 at any age. In practical terms a 12-year-old boy with almost adult development should have more hemoglobin than a 15-year-old boy who has just begun pubertal change. The relationship carries over into management of, for example, diabetes. The boy or girl who has reached Stage 4, regardless of age, will probably need less calories than one at the peak of the growth spurt. If the physician records the maturity stage of his patient at each office visit he has a record of the pattern of growth of the individual boy or girl and may recognize abnormalities of development earlier than age-based changes.

The growth spurt usually occurs between 13

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TABLE 1
Classification of Genitalia Maturity Stages in Boys

Stage	Pubic Hair	Penis	Testes
1	None	Preadolescent	
2	Slight, long, lightly pigmented	Slight enlargement	Enlarged testes; scrotum pink, texture altered
3	Darker, starts to curl, small amount	Penis longer	Larger
4	Resembles adult type, but less in quantity, coarse, curly	Larger, glans and breadth increase in size	Larger, scrotum dark
5	Adult distribution spread to medial surface of thighs	Adult	Adult

TABLE 2
Classification of Sex Maturity Stages in Girls

Stage	Pubic Hair	Breasts
1	Preadolescent	Preadolescent
2	Sparse, lightly pigmented, straight, medial border of labia	Breast and papilla elevated as small mound; areolar diameter increased
3	Darker, beginning to curl, increased amount	Breast and areola enlarged, no contour separation
4	Coarse, curly, abundant but amount less than in adult	Areola and papilla form secondary mound
5	Adult feminine triangle, spread medial surface of thighs	Mature; nipple projects, areola part of general breast contour

and 15½ years of age in boys and during this time they have an increase in height of about eight inches. In the year of peak growth velocity about four inches in height are observed. The boy usually adds about 40 pounds of weight during the period of rapid growth. Girls begin their growth spurt earlier, about age 12 years, and complete it by 13½ years.

Following these peaks height continues to increase but at a greatly decelerated rate. The pattern of growth finds that legs lengthen first, then thigh breadth occurs and this is followed by an increase in shoulder breadth and finally trunk length. Increased height is due chiefly to lengthening of the trunk and legs. Muscle size also increases. Pre-pubertal boys and girls show little difference in muscular strength but with puberty, the boys' muscles increase in size and strength, particularly the muscles of the shoulder girdle and back. All of these changes are correlated with maturity stages and may be easily followed by the physician.

Puberty is characterized not only by physical change but is associated with mental and emotional development of the individual. A simple checklist for mental-emotional growth should be part of each office visit. The adolescent must free himself from his family in that eventually he must become responsible for himself and his welfare; he must develop an appropriate, acceptable sexuality, there must occur an awareness of the need of a vocation and plans for training and he must develop an ego identity by which he knows who

he is, where he fits into societal and peer relationships and how well he accepts himself. These are maturational milestones and should be part of the health evaluation for adolescent patients. And just as there are stages of physical development, so must one expect the 13-year-old patient to have a lesser degree of personal responsibility than the 17-year-old; the young adolescent would have different ideas concerning a future vocation than the older adolescent; but, both should be making progress in these and the other areas that have been listed.

Many difficulties of modern adolescence are due to the fact that various physical, mental and emotional objectives or goals towards which these teenagers are expected to strive cannot be reached at the same time. It would be extremely rare that physical maturity, responsibility for oneself, intellectual balance and emotional stability were accomplished at the same time. As a result of these different schedules and rates of growth and development there are still many needs of the child and the desires of the adult in every adolescent. Much of the apparently irrational behavior and unrealistic expectations of adolescents can be prevented or eradicated by help from understanding adults, particularly interested physicians.

Use of the sex maturity classification and the checklist of mental-emotional development provides a rational means of following the development of adolescent patients and particularly should be employed with any serious illness or handicap which, in itself, may alter physical or emotional growth.

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"On Gypsee"

Gypsee, new baud, is turn'd phisitian,
 And get more gold, then all the colledge can:
 Such her quaint practise is, so it allures,
 For what shee gave, a whore; a baud, shee cures.*

*Ben Jonson, Epigrammes, 1616.

Pregnancy: An Adolescent Crisis

FRED E. MECKLENBURG, M.D.

ADOLESCENT PREGNANCY has been defined in various ways. Pregnancy with delivery occurring to mothers less than 16 years of age is considered an "adolescent pregnancy" in the studies herein cited. It is not within the scope of this article to review all the literature. A number of studies to evaluate trends which will give a public health and societal perspective of the problem will be reviewed. Current thinking regarding the medical hazards of adolescent pregnancy and personal implications from the standpoint of the patient herself will be presented.

From the societal point of view, numerous studies have demonstrated the scope of the problem. Dempsey and associates¹ studied adolescent pregnancy in the city of Baltimore. They found from 1959 to 1961 that mothers less than 16 years of age contributed 1,000 live births annually. At that time the likelihood that a girl enrolled in the Baltimore school system would have a pregnancy during the fifteenth year of her life was 3.7 percent. This means that one out of every 30 girls in the Baltimore school system gave birth to a child during her fifteenth year of life. This included 3.3 percent of the girls who had never been pregnant before. Girls who had delivered a child previous to their fifteenth year of life had a likelihood of 27 percent that they would deliver a second child during their fifteenth year.

Studies from Great Britain^{2,3} have shown that trends in adolescent pregnancy parallel those in the United States. Between 1956 and 1966 the number of pregnant girls in Great Britain between the ages of 13 and 15 rose from 269 per year to 1,288 per year. Eliminating the factor of the increasing number of girls in this age group, there still is a very significant difference, with birth rates in this age group rising from .8 per 1,000 girls to 3.2 per 1,000. This is a fourfold increase over that ten-year span.

Data from the state of Minnesota⁴ show a similar increase in the number of very young mothers,

although of lesser magnitude than the studies cited above. Our vital statistics place all women giving birth under the age of 17 in the adolescent group. In 1950 there were approximately 61,000 girls in the age range between 15 and 17 in our state. There were 215 babies born to this group. Twenty years later the number of girls in that age group had practically doubled to 113,000. (This represents the peak of the post-World War II baby boom.) The number of babies born to this group has quadrupled, from 215 to over 1,000 babies in 1970. Adolescent pregnancy is a very real problem in Minnesota.

The Table demonstrates the data from the state of Minnesota over the past five years. The number of juvenile mothers under the age of 15 has been surprisingly constant. Girls between the ages of 15 and 19 contribute approximately 20 percent of the illegitimate births in this state.

In Minnesota in 1971 almost 60 percent of the babies born out of wedlock were born to mothers under the age of 21. Twenty-one percent were born to mothers under the age of 18. Total teenage pregnancies (the majority of which were conceived out of wedlock whether or not marriage followed) accounted for 11 percent of total births in 1971.

TABLE
Minnesota Live Births
By Year and Age of Mother

Year	Total	Under 15	15-19
1967	64,532	40	7,129
1968	64,759	46	7,456
1969	65,961	43	7,491
1970	68,449	44	8,102
1971		40 (fiscal year)	illegitimate only

Almost 60 percent of all babies born out of wedlock last year were born to mothers under 21 years of age.

Almost 21 percent of all babies born out of wedlock last year were born to mothers under 18 years of age.

Total teenage pregnancies account for 11 percent of live births. Adolescent pregnancy (less than 15 years of age) accounts for less than 0.1 percent in Minnesota.

Why should so many babies be born to these child-mothers? Cutwright,⁵ a sociologist from Indiana discusses several reasons. He minimizes the effect of changing sexual behavior. He states that the major change is the decrease in the age at which girls are physiologically able to reproduce.

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See editorial, page 135.

Over the past 20 years, this age has decreased by approximately one year, shifting the whole scale of reproduction down one year. This mathematical manipulation can account for the majority of adolescent births. Add to this the reduction of pregnancy wastage which has been brought about by improving nutrition and improving maternal care. Many babies that otherwise might have been still-born or spontaneously aborted by these very young mothers 20 years ago can now be carried to term because of improved prenatal care. Cutwright concludes that increased sexual activity plays a minor role.

Traditional medical attitudes about adolescent pregnancy have been drawn from studies that included primarily the very lowest socio-economic group receiving the very worst possible medical care. The statistics were frightening. The classical view has been that the girl who was less than 15 years of age and pregnant had a seriously increased risk of toxemia, an increased risk of severe anemia, an increased risk of prolonged labor, more premature births, higher perinatal loss, greater risk of prenatal and postnatal infections and higher percentage of operative deliveries including both forceps and cesarean sections.

Recent studies, however, have demonstrated that socio-economic factors played a greater role in creating these pregnancy problems than did the age factor. It has been demonstrated repeatedly that with adequate prenatal care the complication rates drop drastically.

Zackler,⁶ reporting the experience of the prenatal clinic sponsored by the Chicago Board of Health, included a group of 2,400 patients 15 years of age and under. He demonstrated that prematurity rates could be cut by one-third by simply providing adequate prenatal care. The perinatal death rate was cut in half in the group of patients receiving adequate prenatal care. The toxemia rate was cut in half. There was a major reduction of all complications to the point that complication rates in the population of girls age 15 and under were not significantly higher than might have been expected for a similar population ten years older.

Sarell⁷ reported on the experience from Yale University where a special program called the "Young Mothers Medical Program" has been instituted. His program includes a combination of excellent medical care with continuing education. Although the study was small with only 119 patients 15 years of age or younger, his reported

complication rates were surprisingly low. He demonstrated that these patients had shorter than expected duration of labor. There were no cesarean sections in the study group.

A large study reported from Syracuse, New York,⁸ demonstrated similar findings. Particularly noteworthy were the very low complication rates.

Physicians must be concerned when providing prenatal care for a very young mother. With adequate medical care, pregnancies in this group should be no more medically intolerable than in any other age group.

The major crisis in adolescent pregnancy is the personal experience of the pregnant girl. A major emphasis must be made on attempting to predict which girls are most vulnerable to pregnancy at this early age. Is it possible to anticipate the adolescent mother? The study from Syracuse suggests this is possible. Several factors show up repeatedly in their population of very young mothers which should alert school authorities, family physicians, or social agencies to a "high-risk" adolescent girl.

The marital status of the child's parents is one such factor. In the Syracuse study, only 41% of their adolescent mothers came from families where the parents were living together. Forty-six percent were divorced or separated. In 12% of the cases, one or both parents were dead. One-parent families seem to predispose to adolescent pregnancy. A second factor which showed up with surprising frequency was chronic truancy. More than 50% of the girls had an early history of repeated unexplained absences from school, often starting at age 10 or younger. An alert school administration should be able to steer the chronically truant child to individuals or agencies which might help her to avoid the crisis of adolescent pregnancy.

The sexual history of adolescent mothers demonstrated that 73% of these girls had been sexually active for two years or longer prior to their pregnancy. Available contraceptive services and programs of adequate family life and sex education should allow us to reach these sexually active girls long before they end up in the physician's office seeking either prenatal care or abortion.

Adolescent pregnancy may represent rebellion or an attempt to punish the parent or parents for an unhappy home situation. This degree of rebelliousness should not be difficult to detect in the adolescent population. The rebellious child representing a definite high risk for early pregnancy deserves particular help in dealing with her multi-

faceted problems.

A study presented in the British Medical Journal⁹ dealt with suicide risks. The risks of suicide committed during a pregnancy is extremely low. This is true whether the pregnant woman is adolescent or otherwise. The study from England showed that in a group of women who had been pregnant prior to 18 years of age, the risk of subsequent suicidal behavior was much higher than expected. This high risk was related to several factors. Suicide was much more likely if the patient remained unmarried. It was also more likely if she came from a higher socio-economic group, if she were Roman Catholic, or if she had a subsequent history of venereal disease. There is *no* evidence to suggest any difference in the suicide risk if the patient carried to term or was aborted. The authors conclude that the pregnancy and the subsequent suicidal behavior are two symptoms of the same disease, and not cause and effect. The young girl with an underlying adolescent psychiatric problem is more vulnerable to adolescent pregnancy and is subsequently more vulnerable to suicidal behavior. We are dealing with a disturbed child who will frequently grow up to be a disturbed adult. Both the sexual and the suicidal behavior are evidence of an underlying adolescent disturbance.

Recidivism rates among adolescent mothers are high. Sarell and Davis,¹⁰ in their 1966 Baltimore study, demonstrated that over 90% of the adolescent mothers subsequently had one or more additional out-of-wedlock pregnancies in the next five years. Dempsey, in the study mentioned previously, demonstrated a 27% recidivism rate during the fifteenth year among patients who had one pregnancy prior to age 15.

Recidivism among the out-of-wedlock pregnant population is a problem also in Minnesota. Five percent of out-of-wedlock mothers less than 20 years of age have had one or more previous illegitimate children.

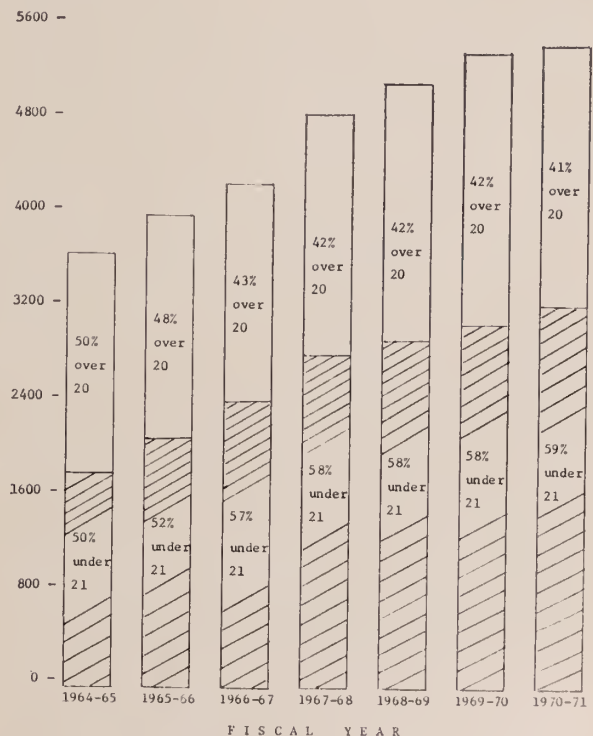
Several authors have described an unwed mother syndrome or unwed mother cycle. This starts with an out-of-wedlock pregnancy. The mother then drops out of school. She subsequently becomes a welfare recipient, followed by repeat pregnancies with loss of self-esteem and failure to become a productive individual. This cycle has been seen to be repeated again and again. It can be broken. It appears that the key point in breaking the unwed-mother cycle is continuing in school.

A program of multidisciplinary help is very important. These girls need adequate medical care, social help delivered in a non-judgmental, sympathetic, and loving manner, and continuing education. In Minnesota social workers are aware of the importance of this approach. Several excellent programs of continuing education are available for adolescent mothers. More than half of the pregnant high school girls continuing with their education in St. Paul are electing to stay in their own school rooms and continuing on until they are close to term. Alternative programs include "special schools" for pregnant women, of which there are several in the Twin Cities area, or home-bound teaching programs.

Undoubtedly, the best approach to the adolescent pregnancy is prevention. Prevention involves sex education and contraception.

The Figure demonstrates that the number of illegitimate births to women over the age of 21 in Minnesota has been declining whereas the contribution of women under the age of 21 is increasingly significant. This points out that progress has been made in reaching the older unmarried mother with sex education and contraceptive services.

Comment: The unmarried mother over 20 years of age (often a repeater) is declining.



Figure—Unmarried mother's age, seven year trend.

Few studies are available which show the positive results of sex education programs. A long-term study done by James D. Lockett,¹¹ instructor in marriage and family living at the Keokuk, Iowa, Senior High School, does demonstrate a very positive yield. His course is elective in the Keokuk High School and includes areas such as premarital sex, reproduction, venereal disease, family planning and the moral code. These are discussed from biological, emotional, and physical standpoints. The course may be elected by any high school student for either a semester or a year. The socio-economic level of the majority of the students taking the course is average or below. Over a 20-year period between 1947 and 1967, 60 percent of the girls in the high school were enrolled in the sex education course. This group contributed only 8.4 percent of the illegitimate children born in Keokuk. The 40 percent of girls who had not taken the course contributed 91.6 percent of the illegitimate pregnancies.

A parallel study on divorce including graduating males between the years 1947 and 1971 demonstrated an equally positive yield. The divorce rate among 1,664 males who took the course was 10.4 percent. The divorce rate among 554 males who did not take the course was 39.6 percent.

Sex and family life education *does* work and *is* important.

The contraceptive program established by Beasley¹² in the state of Louisiana demonstrates the positive results obtained by making contraceptive services readily available to anyone who needs them regardless of age or marital condition. In his pilot study in Lincoln Parish, he demonstrated a drop in the birth rate of 32% in the first year. This was at a time when the birth rate in four adjacent parishes dropped by 6%. In the Lincoln

parish the illegitimacy rate dropped 40% in the first year. The incidence of a second illegitimate pregnancy dropped by 41% in the first year.

A study published by the Office of Economic Opportunities¹³ in 1968 demonstrated a nearly total lack of contraceptive services for Minnesota's medically indigent population. They estimated that 70,000 or 88% of medically indigent women in Minnesota, were not served by family planning services. At that time there were only three counties that offered any significant family planning services for the medically indigent. The situation has improved since then with several county clinics having been organized. Planned Parenthood of Minnesota has opened three regional offices in Mankato, Rochester, and Bemidji. Through these programs they have been able to expand their services to another 22 counties. Between September of 1971 and March of 1972, they were able to reach 2,200 patients. This represents less than 100 patients per county, hardly the kind of saturation family planning services which are needed.

The Minnesota Obstetric-Gynecological Society two years ago unanimously approved a resolution supporting programs of responsible contraception which include: (1) support of Federal, state and local programs to provide contraception to all persons desiring such services regardless of age or marital status, (2) encouragement of individual physicians to provide such services regardless of the age or marital status of their patients . . . , and (3) encouragement of local school officials to institute programs of responsible value-oriented sex education in school curriculums at all grade levels.

The State Medical Association meeting in Duluth in 1970 considered and accepted a similar resolution. However, implementation of the program in these two areas has been slow.

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The Adolescent with Venereal Disease

CHARLES S. MAHAN, M.D.

"IT'S NO WORSE than having a cold." This kind of statement is being heard with increasing frequency by health professionals involved in treating and counselling the patient under age 19 with gonorrhea. It is one of many reasons why the 10 to 19 year old age is becoming an increasing reservoir of both syphilis and gonorrhea.

National and Local Problems

For the past three years gonorrhea has been exceeded in numbers only by the common cold as the most common communicable disease in the United States. Syphilis has held third or fourth position over those years, but has not become epidemic, that is, out of control. The age group of 15 to 25 accounts for the highest number of gonorrhea infections nationally and locally, and the average age of the gonorrhea patient gets younger each year (Table 1).

TABLE 1
Percent of Gonorrhea Cases in
Younger Age Groups
Minneapolis, Minnesota

	Age 0-15	Age 15-19
1966	0.4	16.4
1967	0.9	18.5
1968	1.1	18.5
1969	0.6	20.2
1970	0.9	24.4
1971	1.1	24.0

In 1971, in the state of Minnesota, there were 1,520 reported cases of gonorrhea in people of ages 10 to 19.¹ Since surveys show that only 15% of venereal disease (V.D.) cases are reported, this makes an estimated 10,600 new cases of gonorrhea in Minnesota teenagers. There were 60,000 estimated new cases of gonorrhea in all age groups in Minnesota last year.

In Minneapolis, the Teen Age Medical Service

saw 1,880 people under age 19 for V.D. last year and treated 428 of them for it. This number has increased greatly in 1972. The Youth Emergency Service which has been a tremendous help in directing adolescents to health care, reports a significant shift in calls from drug abuse to V.D. and sex-related problems. The Red Door, a new venereal disease clinic in Minneapolis sponsored by city, county, and state, sees 1,000 patients a month, and 15% of those are under age 19. Twenty-two percent of these patients had positive tests for gonorrhea.

Why Is There an Epidemic of Gonorrhea in Adolescents?

Many reasons are given by V.D. experts as they grope for ways to check the runaway epidemic. Ignorance and fear breed a secrecy in adolescents which causes many not to seek treatment or to give up at the first rebuff. Venereal disease education is poor or nonexistent in the majority of Minnesota secondary schools and in a majority of homes. Couple this with a rapidly increasing number of young adolescents indulging in premarital intercourse, and an increase in sex-related problems (unwanted pregnancy, V.D.) has to result.²

The adolescent homosexual male with a large number of contacts is an increasing reservoir of new syphilis cases, as well as gonorrhea.³ A mistrust of the medical establishment (based on their past personal experiences) keeps many "gay" men from adequate treatment and follow-up.

The fact that 89-90% of women have no symptoms with acute gonorrhea creates obvious problems of epidemiology and treatment.⁴ Since an estimated 10% of all women with acute gonorrhea will develop gonococcal salpingitis if untreated and since an estimated 6-10% of salpingitis cases result in sterility, the asymptomatic woman is a great current concern.

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See editorial, page 136.

Solutions to the Problem

There will be no easy solutions since no disease was ever treated out of existence, and a vaccine for gonorrhea appears to be many years away. We can expect the current gonorrhea epidemic to last five or ten more years before abating. There are steps we can take in the meantime to ameliorate the effects of the epidemic:

Better Use of Current Diagnostic Materials

All physicians and nurses who see adolescents for any reason should consider the possible presence of V.D. in that patient and ask pertinent questions regarding heterosexual and homosexual sexual exposure and practices.

In men, a Gram-stained smear of urethral discharge or rectal, throat, or urethral cultures on Thayer-Martin plates or Trans-Grow medium are the proper diagnostic steps for gonorrhea.⁵ A serology should be drawn for syphilis.

In women, Gram-stained smears are *worthless*, and Thayer-Martin or Trans-Grow cultures from cervix, rectum, and throat should be done as indicated. Some women will have positive rectal cultures and negative cervical cultures. This is due to either spread from vagina to rectum or direct exposure from rectal intercourse. Gonococcal pharyngitis is being found with increasing frequency at the Red Door in women and men with oral-genital sexual exposure. Again, serologies are important as syphilis and gonorrhea frequently travel together.

Adequate Treatment

Table 2 condenses the 1972 recommendations for gonorrhea treatment by the Public Health Service. Copies of this and of syphilis treatment schedules can be obtained from the Minnesota State Health Department.

Penicillin is still an excellent drug for curing gonorrhea in Minnesota. It is cheap, and by using the proper dosage in treating gonorrhea, one can be virtually assured of eliminating incubating syphilis at the same time.⁶

Generic tetracycline is used in patients with penicillin allergy. Doxycycline and minocycline have the same cure rate as generic tetracycline and require smaller dosage, but cost much more. Single stat doses of these drugs are no longer recommended for gonorrhea due to a lower cure rate.

Spectinomycin is a good new drug for gonorrhea, but has the same cure rate as penicillin and

TABLE 2

Gonorrhea Treatment Recommendations U.S. Public Health Service March, 1972

1. Preferred drug for treatment of uncomplicated gonorrhea at all sites is *penicillin*.
—DOSAGE: Aqueous procaine penicillin G, 4.8 million units I-M at 1 visit. (Men and women)
Give Probenecid (oral) 1 gm. at least 30 min. before injection.
Contacts—Patients with history of exposure to gonorrhea should receive same treatment as those proven to have it.
2. If penicillin contraindicated or ineffective:
—DOSAGE: Tetracycline HCl, 1.5 gms. initially, followed by 0.5 gm. four times a day for 4 days. (Total dosage 9 gms.) (Men and women)
3. Alternative to tetracycline or if tetracycline fails:
—Spectinomycin, 4 gms. I-M—men.
—Spectinomycin, 4 gms. I-M—women.
4. Follow-up repeat cultures seven to 14 days after completion of treatment.

tetracycline and a very high price tag. It is used as a back-up if the others fail to cure.

Gonococcal salpingitis and arthritis cases are being seen in much higher numbers now, and only early excellent care, including hospitalization at bed rest and high doses of I-V antibiotics, will prevent the serious crippling sequelae of these complications.

Prevention

Someone at home, at school, or in church, has to teach "responsible sex" during puberty to help adolescents handle the pressing sexual decisions they are increasingly having to make. This would prepare them for decision-making processes involving pregnancy prevention and V.D. prevention.

Using condoms, foam, or diaphragms would certainly help reduce the rate of gonorrhea in adolescents who elect to have sexual intercourse.⁷ Unfortunately these products are seldom used and are, incidentally, sometimes hard for the adolescent to acquire in Minnesota.

The intrauterine devices and oral contraceptives offer no protection against gonorrhea or syphilis, but in our experience, the person responsible enough to use them also seems to be responsible enough to avoid sexual partners with infections (Table 3).

Douching and washing after intercourse are of unknown value. Careful selection and maintenance of one's trustworthy sexual partner is probably the single most important preventive factor for those

who choose to indulge.

Increased public education efforts help warn adolescents of the epidemic nature of the diseases, signs and symptoms, and ideas for prevention and treatment.

TABLE 3
Clinic Variation in Positive
Gonorrhea Cultures. Percentage
Positive of Women Cultured.
Hennepin County General Hospital, 1971

V. D. Clinic	22 %
New Obstetric Clinic	4.5%
Family Planning Clinic	1.2%
All Women Cultured	12.5%

Easier Access to Care

Not enough can be said for the positive effects of the passage in 1971 of a law for treatment of minors in Minnesota. This has helped public and private health care agencies, and providers give care to the adolescent in a much more acceptable way. This results in fewer clashes with the establishment and more adolescent patients coming for help at earlier times. The individual knows he can be checked and treated for venereal disease in complete confidence if he so desires.

The generosity of practicing physicians in volunteering their time to "free clinics" and Teen Age Medical Service (TAMS) has also helped find the adolescent "back-log" of V.D. and bridge a wide confidence gap between adolescent and physician.

Counseling

An adolescent who gets gonorrhea often has many other problems. The Red Door and TAMS were purposefully not set up as World War II "Clap Shacks." They employ nurses, corpsmen, psychologists, and social workers as teachers and counsellors, as well as offering "the shots." While still early in the game, patient acceptance of counselling and teaching is usually enthusiastic, and it seems that this approach is reducing the numbers of "repeaters"—the adolescent who returns for treatment six or eight times a year with new gonorrhea infections. Clinics using this approach detect a hostile attitude on the part of the adolescent toward his educational institutions for not providing such information in the first place.

Conclusions

Most physicians and health professionals will treat gonorrhea, perhaps syphilis, and certainly adolescents sometime in the next year. The health provider must keep up to date with the ever-changing mechanics of treatment of the venereal diseases. He should also be willing to spend some time with the adolescent in sexual counselling and teaching. Good practices and serious handling of these nuisance sexual diseases today in the maturing young adult will help prevent the psychoses, paralysis, blindness, crippling, and sterility of tomorrow.

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Now King David was old and stricken in years; and they covered him with clothes, but he could get no heat. Wherefore his servants said unto him: "Let there be sought for my lord the king a young virgin; and let her stand before the king, and be a companion unto him; and let her lie in thy bosom, that my lord the king may get heat."

*1 Kings: Chapter 1, 1-2.

Drugs and the Adolescent

Current Trends

DOROTHY M. BERNSTEIN, M.D.

THE DRUG SCENE is changing. According to a recent survey of 6,943 college students, drugs are being outranked in interest and concern by: (1) Ecology, (2) Sex, (3) Pollution, and (4) Population problems.¹ Elsewhere there are indications of a decrease in epidemic drug use among the young. Telephone emergency services which developed to serve drug problems now report that only 10% of their calls relate to drugs.

However, those who are treating drug problems would not view the current situation as quiescent. As with any epidemic, there remain the susceptible cases and the unexposed cases in the form of the very young who are newcomers on the drug scene.

Sources of the Drug Scene

The present epidemic of widespread use of illicit and exotic drugs in the United States began approximately in 1963, according to Blum.² This centered around graduate students in university settings. In 1966, adolescents came on the scene as the "flower children" who began to use the psychotropic drugs. This group was replaced by alienated school dropouts with a rapid spread to the use of other drugs—methamphetamine, cocaine, barbiturates. Drug use at this point became epidemic with spread to other age groups. Unique to this epidemic as compared to other epidemics in history was the concentration of the epidemic in a young population—the teenage population, including a spread to grade school children. Previous epidemics have been among young adults and even more mature segments of the population.

The Current Picture

To assess trends in current drug prevalence in the community, a recent study of the population coming to the Mt. Sinai Drug Treatment Center

was examined. This included 250 outpatients seen over a period of 16 months. Of that number, 100 currently are on a Methadone Maintenance Program and 59 are in the Park Avenue Rehabilitation Center Program (PARC)—a group with nonnarcotic drug problems. Figure 1 shows the age distribution of the latter group. Of these 63% are adolescents ranging in age from 12 to 19 years. This population was examined in the following areas: (1) Age grouping and concentration, (2) Sex distribution, (3) Residence, (4) Drug of choice, (5) Source of drugs, (6) Duration of use and (7) Motivation for use.

Of the adolescent population, 22% are in junior high school and 78% are in senior high school. Peak use is in the 17 to 19 year old group. This compares in distribution with a recent survey of an entire school population of 56,000 junior and senior high school students by Gossett, et al.³ Their findings showed that 28% of the students had used illicit drugs only a few times; 8% had used drugs more than ten times; 4% used drugs frequently. The last group can be considered to be drug abusers. From various sources such as school surveys,⁴ referral centers, the counts, police services, and street drug counselors, drug

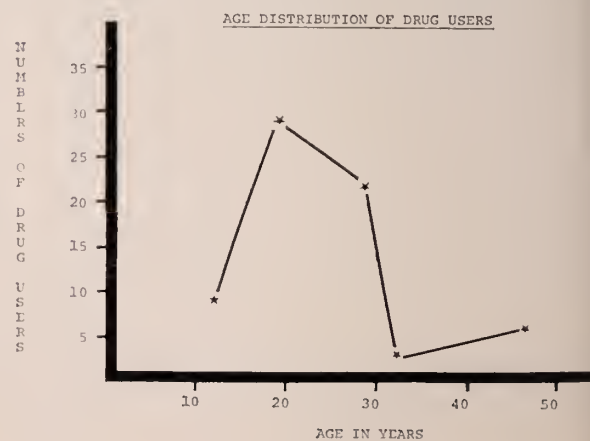


Figure 1

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See editorial, page 133.

abusers range from 4 to 5% of the school age population in the local community.

In sex distribution, 56% are male and 44% are female. This alters earlier figures in which drug users were predominantly male. At times the girls use drugs in mixed groups. At other times the groups are comprised of girls only. An example is epidemic abuse of Darvon or barbiturates reported in girls' schools. As to frequency of usage of any single drug, however, boys exceed girls in all categories.

In this study, 47% of users came from inner-city residences, whereas 53% are from the suburbs. Again, this reverses earlier figures in which the stronghold of drugs was in the inner city. Since this clinic serves a model city area, the figures for the suburbs are underestimated.

Figure 2 shows the distribution of individual drugs used by adolescents. Among the younger teenagers, poly drug use is the commonest phenomenon. Late teenagers show a single drug preference with amphetamines and barbiturates ranking highest. This constitutes a more serious problem because it represents the discovery of a single drug to meet a specific intrapsychic need. The young experiment with many different drugs and combine drugs, exposing themselves to overdose, potentiation of drug action, and side effects. They may inject into a vein a drug meant for oral ingestion. Many illicit drugs contain impurities that may be toxic or alter drug action. Still seen in young adolescent groups are epidemics of inhalant use, as for example, glue sniffing in Indian grade schoolers. In this clinic, only 1.5% of late teenagers were addicted to heroin. They were placed on a detoxification program initially

since the lower limit of the Methadone Maintenance Program is 21 years.

For young teenagers, the most frequent source of first drug experience is from drugs obtained within the home. To sustain drug use, supplies are easily obtained from peers or street sources. Amphetamines or heroin are obtained primarily from adult "pushers." At this Center, it has been found that teenagers usually are defensive about telling the source of their drugs. However, as a rule, they enumerate the drugs they are using freely and may even magnify the number.

Duration of use presents a varied picture. Younger drug users tend to be transient users. Older adolescents with a sufficient problem to be detected and referred to a drug treatment center have a longer history of consistent and repetitive drug use. They report starting with a wide variety of drugs at an earlier age. At this point, their life style often is beginning to show a chronic dependency on drugs. This is consistent with the findings of Shearn, et al.⁵ Their data suggested that the use of any drug before age 15 in psychologically vulnerable individuals points to future serious drug usage. This is particularly true for use of barbiturates and narcotics.

Why Drug Use?

No single pattern of motivation for drug use was seen. Three factors were found more frequently than others: (1) In younger, susceptible adolescents, drugs were found to be a means of gaining acceptance into peer groups. For many adolescent groups, drugs have come to be a form of initiation rite. (2) In younger, vulnerable groups, drug usage was found to be an exaggeration of the normal exploratory or curiosity urge as described by Harlow.⁶ (3) In the older group, drugs were used to cope with adolescent conflicts. Drugs were used to deal with feelings of depression, alienation, low self-worth or confused personal identity. This group turns to drugs to avoid psychological pain rather than for pleasure.

What To Do

To circumvent each succeeding generation of adolescents from being initiated into drugs, preventive efforts must be instituted earlier. Drug education must begin prior to adolescence. As the legal prescriber and dispenser of drugs, the physician is in a position to define and utilize primary prevention.

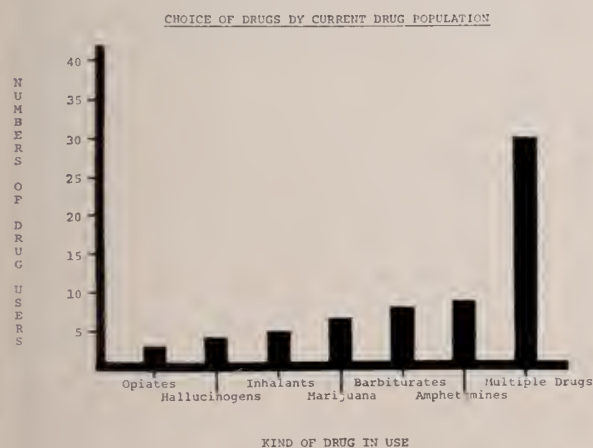


Figure 2

1. Physicians must avoid prescribing drugs for minimal stresses and frustrations of adults. Otherwise, by identification, their children may become sensitized to drug use in coping with adolescent stresses.
2. Physicians should not oversupply drugs. One recent survey revealed an average of seven different prescription drugs per home medicine cabinet. Most were outdated. Often these serve as a source of a first drug experience to adolescents. Also, they are the prime vehicle of adolescent suicide attempts.
3. For young children, the physician needs to guide the parents to emphasize specificity for drugs in a matter of fact way rather than dwelling on an enticing quality of taste or color. Manufacturers have already done this.
4. For teenagers, the physician may be the unknowing source of a first drug experience by dispensing drugs such as barbiturates in routine orders.

It has been found in this Center that the young teenager deeply caught in peer group drug usage often has more than he can cope with in the situation and wants to be rescued. He may present himself in a round-about way for discovery, such as going to the school nurse for an abscess caused by drug injection. If a drug problem then comes to the physician's attention, the most rapid course of action is a diagnostic interview with the teenager and his family. For a minimal problem, counseling by the family physician may suffice. For continuing drug use, individual psychotherapy or direct referral to an outpatient drug treatment center is indicated. For the severe drug user, a residential treatment center should be considered.

Conclusions

A study of current drug users referred to the PARC Program at Mt. Sinai Drug Treatment Center shows that the greatest number are adolescents. However, current figures show a decrease in total numbers as compared with figures 16 months ago. This is in spite of the Center being more widely known at present.

Although there is a decrease in total number, the severity of individual drug problems in the 17 to 19 year old group seen in this clinic is greater. The largest source of new cases is in the 12 to 15 year old group. At present these are transitory cases. This age group may prove to be the endemic reservoir of future drug problems.

Thus, although in considering total numbers, the drug epidemic may be waning, serious potential hazards to youth continue to exist. New complications are being reported, as for example, strokes and persistent dyskinesias in adolescent drug users.^{7,8} The psychosocial problems that the vulnerable adolescent may seek to resolve by drug use remain unsolved.

If drug abuse in future adolescents is to be circumvented, the focus for physicians, educators and parents must be on childhood. The child must be taught not only to be discriminating about useful drugs, but acquire concepts of how to cope with stresses and tensions that may later lead to drug abuse. Indications are of a return to alcohol—the licit drug—in the high school population. Drug education in childhood must also focus on that established drug problem.

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St. Paul Children's Hospital

Dr. Richard E. Sand, pediatrician, is the new Chief of Staff for the St. Paul Children's Hospital Medical Staff.

At the Hospital's annual meeting, Dr. Robert T. Dooley was voted Chief of Staff-elect and Dr. Krishna M. Saxena was elected Secretary-Treasurer of the Hospital's 280-member Medical Staff.

Others elected were Dr. Robert W. Geist and Dr. John W. Reynolds to the Executive Committee of the Medical Staff; Dr. Thomas L. Huseby to the Liaison Committee of the Board of Trustees; and Dr. Stanley J. Antolak, Dr. Thomas P. Keenan, Dr. Ronald M. Lampert and Dr. R. James Vaccarella to the Medical Care Committee.

Management of Adolescent Suicide Attempts

DAVID W. CLINE, M.D.

THE RATE OF ADOLESCENT suicide attempts and adolescent suicides has dramatically increased over the past decade. In 1969, it was reported that among youth from age 15-24, suicide is the third highest cause of death although absolute numbers are low.¹ Among the college student age group suicide seems to be the second highest cause of death. All these figures are judged to be under-reporting, since suicide still casts a stigma on survivors. Coroners attempt to report accidental death when suicide was, in fact, the case. Automobile accidents of a single car type may be suicides that are undetected. Ross² estimated that for college students the incidence of suicide is 10.5 per 100,000. Jacobzimer³ estimated the total number of suicide attempts in the American population below 20 years of age to be 60,000 per year. He gave evidence that the figure is rising. The University of Minnesota Hospitals' Adolescent Young Adult Psychiatric Service has from 50-65% of its 20-bed population persons who attempted suicide.

There have been numerous studies on the prediction of suicide in patients by studying predisposing factors. All the studies using psychometric instruments revealed no consistent patterns in adolescent suicidal patients. Unlike adults the suicidal adolescent is not prone to demonstrate particular behavioral change prior to suicide attempts.⁴ Most suicidal acts in adolescents are impulsive behaviors that result from a family quarrel or a boyfriend-girlfriend dispute. In the psychotic adolescent one can identify suicidal intent more clearly. For example if the youngster reports that he hears voices from God telling him to kill himself, he is obviously a serious suicidal risk. Suicidal intent in the schizoid or paranoid adolescent is more difficult to detect. Psychotic adolescents

should be thought of as suicidal until they are well enough understood to rule out this possibility.

A consistent finding was made by Moss and Hamilton⁵ regarding family as an integrated unit in suicide or suicide attempts. They found that in 95% cases of suicide, there was death or loss of an individual close to the patient. These investigators conducted a study evaluating death trends in two groups of control subjects and an experimental group. A control group of 50 patients not considered potentially suicidal were selected for age, marital status, diagnosis at the time of hospital admission. Another control group were those patients who were considered potentially suicidal, but who had never attempted suicide, the experimental group were patients who had attempted suicide. Whereas the death trend was found in only 40% of each of the control groups, the experimental group reached the 95% level. They found that the death of a parent in suicidal patients was four times as frequent as in non-suicidal patients. Schrut⁶ found among 50 victims, age 15-20, that two-thirds of the parents had been divorced or separated prior to the incident. Approximately 50% of the patients had previously reported long and bitter clashes with parents. It was also found that suicidal ideation was common in the parents of the suicidal victims. In five of 14 patients, suicide was precipitated by rejection from a boyfriend. Another striking finding was that parents had often communicated overtly or covertly to the patient that he was unwanted during this period of his life, or even at birth. Sabbath⁷ describes the adolescent-suicidal patient as being an "expendable child," and Rosenbaum and Richman⁸ describe the role of hostility and death wishes from the family and significant others in suicide. It is clear from previous research that whenever an adolescent attempts suicide it is a manifestation of emotional instability and thorough evaluation is necessary.

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See editorial, page 133.

Assessment of Suicidal Behavior

The recognition of suicidal potential in the adolescent will enhance the physician's ability to deal with this problem effectively. Depression is seen less consistently in adolescents as typified by the symptoms of depression in adults. If it is present, it is a valuable sign of possible suicide intent. Others have suggested that depression has special characteristics in teenagers and is just not recognized. A depressed teenager may talk about feeling sad, hopeless, "turned off," or blue, or may say nothing at all. Others may resort to somatic complaints, such as excessive fatigue, inability to sleep or loss of appetite. An overt manifestation may be the adolescent's inability to concentrate, which is best reflected in school grades. Depressive equivalents may also be manifested by marked change in behavioral patterns to include running away from home. Another common manifestation of suicidal intent, especially in girls, is a school theme or note that expresses the possibility of suicide or a wish for death.

Any suicidal threat or attempt should be taken seriously. Notes, gestures, or essays may merely be manipulative attempts, but some are not. A healthy teenager does not dwell on these themes. If the physician thinks there is a possibility of suicidal ideation in an adolescent patient, he should question the patient regarding that possibility. Many teenagers are then willing to discuss their hidden thoughts. The youngster who has not had a suicidal thought may answer the question with a qualified "No." Such an answer has little meaning since most people have had thoughts about dying at one time or another. It is important for the physician to evaluate the response of the adolescent in regard to this matter. It is most important to establish good rapport with the patient, since good rapport continued over an extended period of time can be good insurance against actual suicide.

When a suicidal attempt has been made, it is important for the physician to gather sufficient data as to the method of attempt, predisposing factors, family background, and adjustment of the patient in the culture at large. There are some objective criteria for evaluating the seriousness of suicidal intent. The method used for the attempt is one example. Usually, the more serious the method, the more serious the intent. Such things as shooting oneself, running in front of an

oncoming automobile, or jumping from high places are examples of serious attempts. Cruel, bizarre self-mutilative attempts are usually found in seriously psychologically disturbed adolescents. Slitting one's throat or stabbing oneself in the eye are examples. Suicide in which there are clear attempts for the act to be discovered are not usually serious. Other rules that are not infallible truisms are: If the patient is grateful or significantly relieved following the suicide attempt, the attempt itself would appear less serious. If the patient is resentful at the fact that he was found and revived, the attempt was a serious one and, furthermore, the prognosis is poor. Suicide attempts that involve injury of another person should always be taken seriously.

Management

When a suicide attempt has been made, some immediate problems must be attended to. Risk to the patient's life must first be assessed. This means immediate medical management of life-threatening possibilities. Induced emesis, gastric lavage, control bleeding, monitoring blood pressure, respiration, fluids and electrolytes are all important medical procedures that may be necessary. After the patient has made a physical recovery, the question of whether further psychiatric hospitalization is necessary must be determined. Since psychiatric evaluation is necessary in all suicide attempts, this can often best be facilitated on an open psychiatric ward. Moss and Hamilton⁵ have described three phases of recovery following a suicide attempt. In the acute phase, the patient is often panicked, perplexed, and confused by his behavior. At this time the patient needs protection and relief from anxiety, hopelessness, and most important of all, restoration of relationships with others. This is best provided in an open psychiatric or medical ward community. Constant observation is necessary even when the patient wants to be alone. He needs reassurance by the presence of others. Sometimes, face-saving maneuvers are necessary to help reintegrate the family with the patient. Family counseling in regard to the problem is helpful. Friends and relatives need to be coached on how to approach the patient, emphasizing the need for an accepting concerned attitude. In the convalescent phase, the patient becomes more comfortable in the hospital and this is the phase of active psychotherapy. This may be the first critical period since the patient

may want to deny the significance of his act and thus hide the real problems that induced it. This has been called a flight into reality which produces serious complications in 25% of all cases, i.e. further suicide attempts if the patient were to suddenly leave the hospital, denying that he had any problems. It should be noted that families often wish to deny the impact of a suicidal gesture, since they too may be reluctant to acknowledge the emotional turmoil creating the suicide attempt. It is important during this convalescent phase that psychological problems encountered by the patient be explored with some resolution.

During the third phase, the recovery phase, the patient is back in contact with his environment. This is another critical time, since in 90% of patients studied Moss and Hamilton,⁵ the suicidal drive was reactivated when the patient came into contact with the family and community where the illness began. For example, four-fifths of all reactivations of suicidal drive occurred when the patient had been discharged or was on an overnight pass to home. What is important in this phase is continuity of the therapeutic relationship. Forewarning to the patient that such reactivation may occur is important and close support and availability of the therapist is essential to good outcome.

It is important to point out that the physician

need not be the only therapist for the adolescent who has made a suicide attempt. Office nurses or specially trained mental health care personnel can be of great value in the personal therapeutic contract necessary to manage these problems. Studies by Rioch⁹ and Cline¹⁰ have shown the capabilities of such personnel in efficaciously conducting psychotherapy.

Successful outcome in adolescent suicide attempts has most often been attributed to active intervention in the patient's home environment. In this regard it is important to help the family and relatives gain insight into possible hostility and rejection that they may have towards the patient. All of the therapeutic endeavors, without exception, involve the therapist initially being very supportive and treating the patient with care, concern and protection.

Suicide is not always preventable. In the event that suicide does occur, the physician can be helpful to the family in accepting the death in the same way that he is when death occurs from other causes. As important, the physician should attend to his own needs over the loss of a patient under his care which usually produces guilt and anger. Frank discussion with one's trusted medical colleagues over the event is often a very helpful procedure that casts realistic light upon the suicide event and can be instructive in management of future suicide problems.

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Two Minnesota Specialist Admitted to American College of Cardiology

Two Minnesota doctors, Fredarick L. Gobel, Minneapolis and Gerald T. Gau, Rochester, have been granted Fellowships in the American College of Cardiology, the national medical society for specialists in cardiovascular diseases. The doctors are among a group of 94 from United States and Canada recently admitted this fall to the College's highest membership classification.

The Minnesota doctors, as well as the other new Fellows, have fulfilled stringent membership requirements based on years of practice and specialty certification.

Kyphosis and Postural Roundback Deformity

in Children and Adolescents

DAVID S. BRADFORD, M. D., JOHN H. MOE, M.D. AND
ROBERT B. WINTER, M.D.

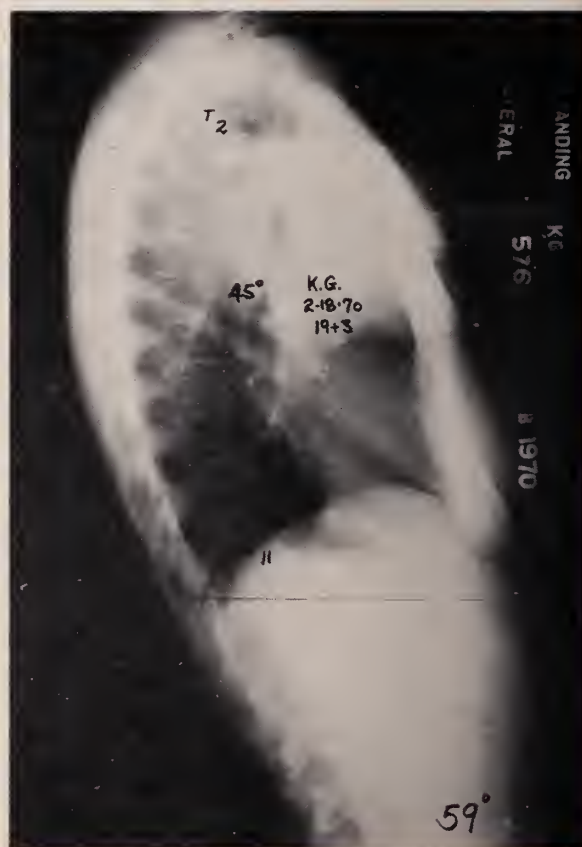
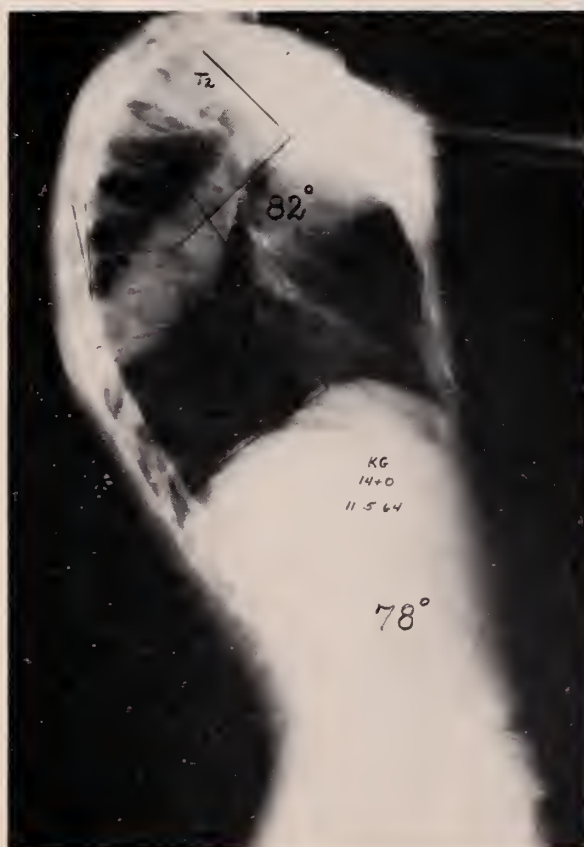
AMONG THE DEFORMITIES which may arise during childhood and adolescence, kyphosis remains one of the most neglected. Parents and even physicians may recognize the presence of a roundback curvature of the spine but may pass it off lightly as a "problem of poor posture." Overzealous urging of the child to hold up his shoulders

results in little more than mutual irritation between the parent and child, the slumped shoulders being the result and not the cause of the kyphosis. Early recognition and proper treatment of these patients can be expected to produce a superior result not only in correcting deformity but also in alleviating back complaints (Figures 1 and 2). The purpose of this paper is to describe this disease process, and to present a plan of management.⁴

Etiology

Juvenile kyphosis was a vague concept until

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Figures 1 (left) and 2 (right)—Xrays demonstrating 14-year-old patients with Scheuermann's kyphosis, measuring 82 degrees from T2-T11. Vertebral wedging of T7 is nine degrees. Vertebral end plate irregularity is also demonstrated. Following Milwaukee brace treatment for two years, wedging has gone and kyphosis has decreased to 45 degrees.

1920 when Holger Scheuermann⁶ first demonstrated radiographically that the deformity was caused by wedge shaped deformities of the vertebra. In 1964 K. Harry Sorensen⁸ further defined this concept and suggested that Scheuermann's disease should be taken to mean a kyphosis including three adjacent vertebra with wedging of five or more degrees. The etiology of Scheuermann's juvenile kyphosis remains unknown. The speculations outlined in the literature are as diverse as the authors who have written about them. Scheuermann, in 1921,⁵ proposed a disease process caused by avascular necrosis of the cartilage ring apophysis of the vertebral bodies. With the onset of avascular necrosis of the vertebral body, growth inhibition and ultimately kyphosis developed. Bick and Copel in 1951,¹ however, noted that the limbus, or ring apophysis, was not connected to the growth plate and therefore contributed nothing to the longitudinal growth of the vertebra. Schmorl, in 1930,⁷ suggested that herniation of the intervertebral disc material through the growth plate produced the kyphosis. These so-called Schmorl's nodules may

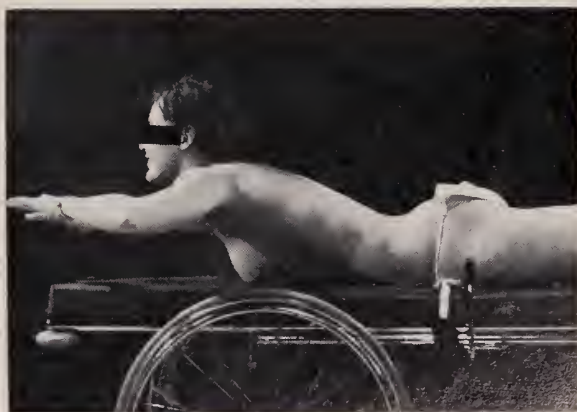
occur in patients who do not have Scheuermann's disease. Muscle disease, hereditary, endocrine abnormalities, growth imbalance, vitamin deficiency, and infections have been suggested as important etiologic factors but these factors remain unproved.

Clinical Description⁸

There are no definitive studies concerning the early pathogenesis of Scheuermann's disease. Other than increase in thoracic kyphosis, radiographic changes are not prominent until the child reaches ages ten to twelve. The incidence of Scheuermann's disease in most reported series would appear to be from two to six percent of the population, with males and females being equally involved. A family history of kyphosis is often positive but a genetic pattern has not been confirmed. The symptoms are frequently vague. The patient sometimes complains of pain or fatigue at the apex of the kyphosis but this is usually mild and may be overlooked unless specific inquiry is made. On examination, thoracic kyphosis with lumbar lordosis will be apparent (Figure 3). The prone hyperextension test is of great value in judging the mobility and degree of fixation of the kyphosis (Figure 4). Direct tenderness and muscle spasm may be elicited over the apex of the curve, and an associated scoliosis visualized in approximately 40% of the cases. The pectoral and hamstring muscle groups often prove tight. Rarely, neurological examination may reveal a spastic paraparesis. This is usually secondary to cord angulation at the apex of the curve.

Xray

Xray evaluation must be thorough. A lateral Xray of the spine with the arms parallel



Figures 3 (left) and 4 (right)—Kyphosis is demonstrated, which on prone hyperextension decreases markedly. This is also a useful exercise to aid in correcting the kyphosis. See text.

to the floor with the hands resting on a support is most helpful in evaluating the curvature. A standing fourteen by thirty-six inch Xray of the spine is essential in order to rule out an associated scoliotic curvature. A supine hyperextension lateral of the thoracic spine using a polyurethane plastic wedge placed at the apex of the curvature facilitates this exposure and provides important information concerning the mobility of the curve. Finally, a hand Xray should be obtained to assess the extent of skeletal maturation.³ The degree of kyphosis, lordosis, and vertebra wedging is then calculated. The angles are outlined by marking the end vertebra or that vertebra which is maximally tilted into the curve and drawing a perpendicular line to the end plate. The angle thus formed is considered to be the kyphotic angle. The sacrum is considered to be an end vertebra for the measurement of lordosis (Figure 1). Vertebral wedging is outlined in a similar fashion.

Early characteristic findings of Scheuermann's disease include wedging, Schmorl's nodules, irregular end plates, and mild scoliosis (10 to 20 degrees) with or without rotation. Although per-

sistent vascular grooves in the vertebral body has been stated to be of importance in the diagnosis as well as pathogenesis of this disease, we have not found this to be the case. Late radiographic changes include concave anterior borders of the vertebral bodies, a flattening of the vertebra giving an increase in anterior-posterior dimension, synostosis and exostoses between the bodies (Figure 5). One should assess skeletal age not only by the hand Xray but also by noting the maturation of the iliac crest apophysis and the vertebral ring apophysis. The best radiographic criteria for the diagnosis of Scheuermann's disease has proven to be evidence of irregular end plates and vertebral wedging along with an increase in the normal thoracic kyphosis. Normally the thoracic spine is kyphotic and the lumbar spine, lordotic. Accurate control studies demonstrating the normal range for these angles are unfortunately not available. From limited unpublished studies in our department we have felt that kyphosis definitely increases with age and that the upper limit of normal in the adult appears to run between 35 to 40 degrees.

Differential Diagnosis

Most authors have emphasized the problems occasionally encountered in differentiating kyphosis from infectious spondylitis. However, with a thorough clinical and laboratory evaluation, as well as tomography of the spine, the true diagnosis should be readily established. Traumatic injuries to the spine occasionally present a confusing picture but usually only one vertebral body is involved, while in Scheuermann's disease many vertebra are involved. Osteochondrodystrophy, such as Morquio's and Hurler's disease, as well as osteomyelitis, tumors, and congenital kyphosis,

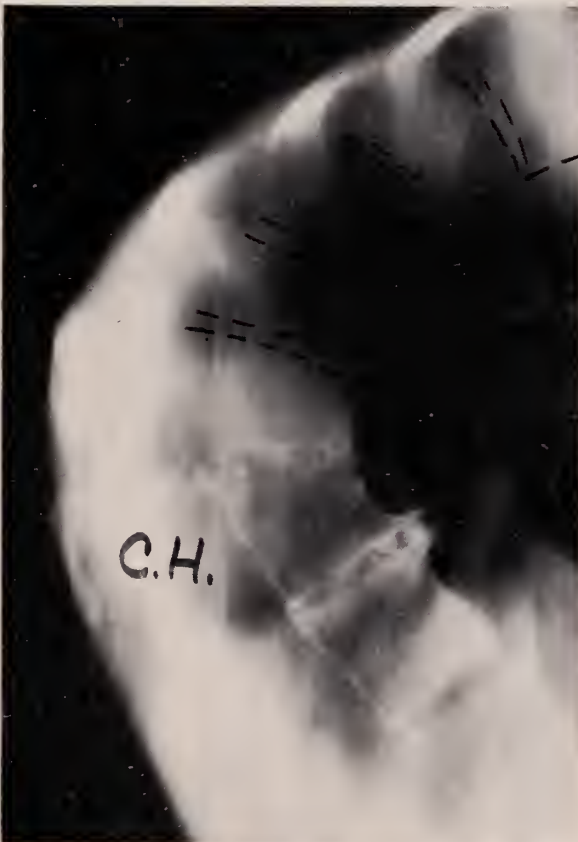


Figure 5—Late radiographic changes of Scheuermann's kyphosis are visualized: wedging with concave anterior vertebral borders, synostosis and exostosis.



Figure 6—Colrel traction on the bent Bradford frame.

may be considered in the differential diagnosis. These rarely pose much of a diagnostic problem. Lumbosacral anomalies should always be ruled out. Spondylolisthesis at L5-S1 can produce a severe lumbar lordosis and consequently a compensatory thoracic kyphosis. These patients may be completely asymptomatic except for the round-back deformity.

Complication of Scheuermann's Disease

A kyphosis less than forty degrees is infrequently of cosmetic significance. If the curvature becomes greater the clinical deformity will be more pronounced even in the obese individual. Deformities above seventy degrees are quite noticeable and because of an increased compensatory lordosis and forward protrusion of the cervical spine they present a cosmetically objectionable appearance. Curves of this magnitude may increase even after skeletal maturation is completed. Pain and fatigue at the apex of the kyphosis is present in approximately one-half of the patients

before they reach age twenty. This is mild and usually not disabling. After maturity the incidence of thoracic pain seems to decrease but in some patients it may be disabling. The incidence of low back pain does not seem to be any higher than that in the normal population. Rarely signs and symptoms of upper motor neuron disease can be associated with the kyphosis. A spastic paraparesis may develop secondary to cord compression or a herniated thoracic intervertebral disc. One should always carefully examine the AP Xray of the thoracolumbar spine to be sure that widening of the interpedicular space has not occurred. Spinal epidural cyst can be associated with the classical radiographic changes of Scheuermann's disease as well as a widened interpedicular space.

Treatment

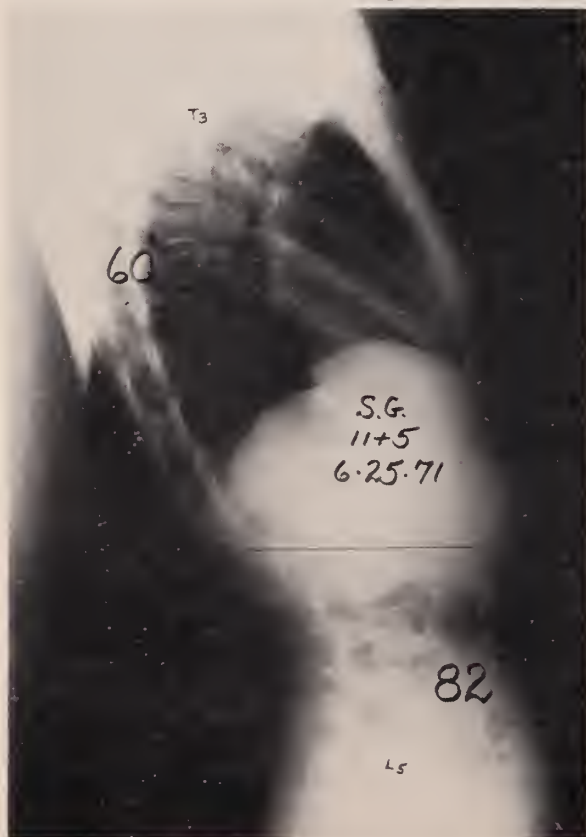
Treatment of juvenile kyphosis relies on an exercise program, a Milwaukee brace, traction, Risser antigavity casting, and surgery (Figures 6, 7, 8). The Milwaukee brace is the treatment of



Figures 7 (left) and 8 (right)—The Milwaukee brace as used for the treatment of kyphosis. Notice that the double uprights contain split kyphosis pads directed against the apex of the gibbus. The occiput pads fit under and not above the occiput. The throat mold touches the neck but the patient can raise the chin one finger breadth from it with neck extension. A turtle-neck shirt can completely hide the neck piece of the brace.

choice in a growing child with a flexible curvature. If the curve is rigid and the patient has finished growth, little improvement in the kyphosis or wedging can be expected. It may prove difficult in the young juvenile to differentiate Scheuermann's disease from a postural flexible roundback deformity. Frank radiographic changes of Scheuermann's disease, ie: wedging, may not develop until after the child reaches adolescence. One may wonder in fact if a true flexible postural roundback may develop into a structural kyphosis with vertebral wedging. Therefore this problem poses not only a diagnostic but also a treatment dilemma. It is our impression that end plate irregularity is one of the earliest radiographic features of Scheuermann's disease. This may be demonstrable long before vertebral wedging is apparent. On the other hand it appears that a pure postural roundback deformity untreated may develop into a rigid kyphosis with wedged vertebra. The treatment of either problem, therefore, would depend on the severity of the deformity and the type of radiographic changes in the vertebra. A young child with a supple roundback may be initially treated with exercises alone (Figures 9 and 10).

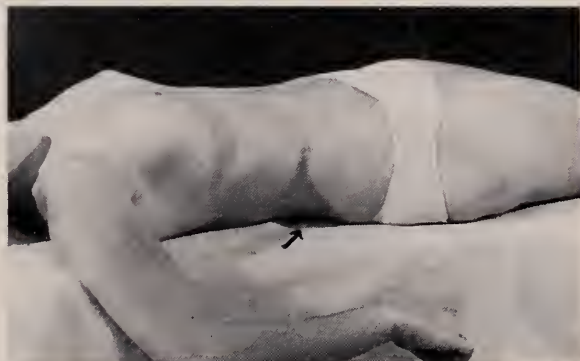
However, any progression of the kyphosis should be managed with a Milwaukee brace. The patient with radiographic changes of Scheuermann's disease with vertebral wedging is best managed with a Milwaukee brace from the onset. The use of the Milwaukee brace combined with a carefully planned exercise program can be expected not only to overcome the degree of vertebral wedging, but also decrease the angle of the kyphosis by forty to fifty percent of its pre-treatment value. The brace must be properly fabricated, worn twenty-three hours a day, (the patient sleeps in the brace, is allowed one hour out of the brace per day for skin care and personal hygiene), and carefully checked by the physician on each follow-up visit. On the initial visit, if a kyphosis appears rigid as determined by the hyperextension Xray, a two-week period of traction in the hospital on a reverse Bradford bed frame is carried out followed by the application of a Risser antigravity cast. The cast may be changed several times in order to obtain more correction while the Milwaukee brace is being fabricated. When the brace treatment has begun, a specific exercise program is initiated by the physical therapist. This is directed at de-



Figures 9 (left) and 10 (right)—Xrays of a patient with a pure postural roundback. Treated by exercises alone. Note absence of vertebral end plate irregularity, and wedging.

creasing lumbar lordosis, overcoming muscle contractures by muscle stretching when necessary, and correcting the kyphosis by thoracic hyperextension (Figures 4, 11, 12). The patient is checked with repeat Xrays in the brace at four month intervals. When skeletal maturation has approached completion the patient may be gradually weaned from the brace. The weaning process initially consists of short periods (two to three hours) out of the brace during the day progressing finally to brace

wearing at night only. Xrays both in the brace and out of the brace for the specified period of time are carefully compared. Loss of correction suggests the weaning has been too rapid and the period of time out is decreased accordingly. Total brace wear, including night time wear only, averages three to four years (Figures 13, 14, 15). As a practical guideline, we have found that once the kyphosis and wedging are corrected, weaning from the brace can be rapidly carried out.



Figures 11 (left) and 12 (right)—Lumbar lordosis is corrected by pelvic tilting exercises. Notice how in Figure 12 the lordosis has decreased as a result of tilting the pelvis and flattening the lumbar spine against the examining table.



Figures 13 (left), 14 (middle), 15 (right)—End result on patient in Figure 3. Milwaukee brace worn full time for approximately one and a half years. Original kyphosis 55 degrees; corrected to 17 degrees.

Rarely, surgery may be necessary. The indications include severe kyphosis in a patient who has completed growth, severe and disabling back pain in the area of the kyphosis which is unresponsive to conservative management, and neurological signs and symptoms secondary to the kyphosis. Surgery consists of posterior spine fusion, Harrington rod instrumentation, with iliac crest bone grafting, followed by plaster immobilization for a period of nine months (Figures 16 and 17). We have generally felt that the incidence of pseudarthrosis and loss of correction was minimized by keeping the patient supine for four months following surgery. Anterior fusion may be necessary in those cases with kyphosis greater than seventy-five to eighty degrees or in those patients with an asso-

ciated neurological deficit requiring anterior cord decompression.

Summary

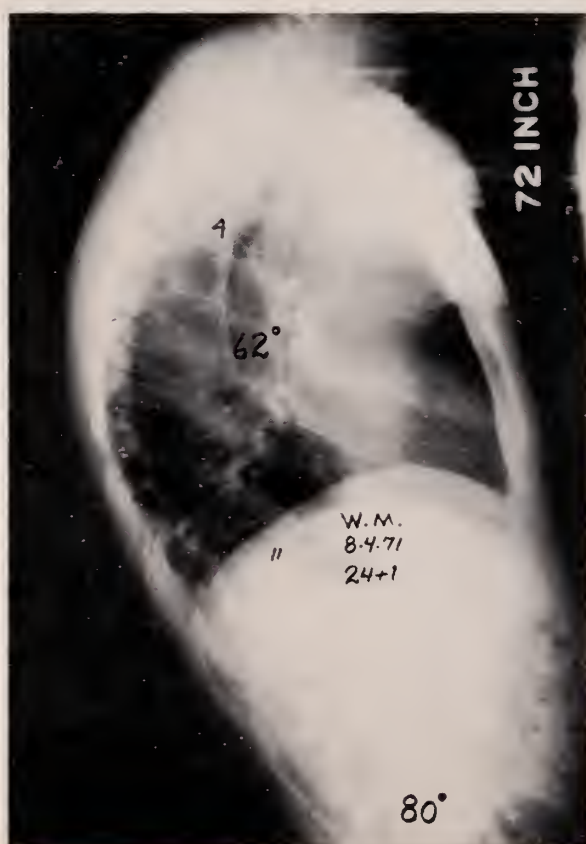
Juvenile kyphosis has unfortunately remained a poorly recognized entity. It is felt that earlier recognition and treatment of this problem can prevent progressive deformity, disabling back pain, and neurological complications. An outline of treatment is presented which the authors have found to be highly effective in the management of patients with this disorder.

Acknowledgment

We would like to express our appreciation for the help and support of the Gillette Children's Hospital staff, particularly Miss Jean Conklin and Mr. Ned Gardner, for their cooperation in facilitating this work.

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Figures 16 (left) and 17 (right)—Pre and postoperative Xrays in a 24-year-old male with a severe kyphosis. Surgery carried out because of disabling back pain. Patient relieved of symptoms following successful fusion.

Dermatoses of Adolescence

BRUCE J. BART, M.D.

THERE ARE NO DERMATOSES exclusive to the adolescent period. Some skin conditions, however, are commonly seen in this age group. Others, previously infrequent in preadults, are now seen in increasingly numbers relating to increased sexual promiscuity and use of drugs.^{1,2}

Acne

Acne is the most common dermatosis in the adolescent period; indeed, its development may be considered physiologic. The emotional impact, particularly in those persons with the pustular, cystic, and scarring varieties of acne, may be devastating.

Modern concepts of the mechanisms of this condition have led to more rational and successful treatment and control.³ Certain bacteria in pilosebaceous areas produce lipolytic enzymes, causing breakdown of sebum. Fatty acid end-products, primary irritants to ductal and follicular walls, produce the inflammatory reaction clinically appearing as the inflamed "papule," pustule, or pseudocyst.

Systemic antibiotics, particularly the tetracyclines, are most helpful in suppressing these lipase-producing bacteria. Topical agents such as Vitamin A acid, Benzoyl peroxide lotions, and sulfur and resorcinol lotions help to remove comedones and prevent further obstruction of pilosebaceous structures. Surgical expression of comedones, exposure to ultraviolet irradiation, injection of inflamed pseudocysts with corticosteroids, systemic corticosteroid drugs for acutely inflamed conditions, and dermabrasion for unsightly scars are other useful treatment methods.

Dietary factors in acne may influence the course of the condition. Patients are advised to eat a well balanced diet. Advice regarding cosmetics, skin hygiene, and scalp care is also important.

Dr. Bart is Chief, Department of Dermatology, Hennepin County General Hospital, Minneapolis, Minnesota and Assistant Professor, Department of Dermatology, University of Minnesota, Minneapolis, Minnesota.

Warts

Warts are tumors of skin or mucous membranes caused by viral agents.⁴ They may be found in all age groups and affect any cutaneous surface. Warts probably occur with greatest frequency in the childhood and adolescent periods. Areas of predilection are the hands, feet, and genitalia.

Warts spread by inoculation of virus into the skin surface and may be transferred from person to person by direct contact or indirectly from fomites. After entry of the virus into the skin incubation may take several months until the wart appears.

Treatment of warts include studied neglect (many warts disappear spontaneously after a few months or years), proprietary peeling creams, topical chemosurgical agents, cryosurgery with liquid nitrogen, electrosurgery, surgery, local injections and irradiation with low-voltage Xrays. None of these methods is predictably successful. Immune antibodies to wart virus have been measured in patients with resolving warts and are probably an essential part of successful resolution.^{5,6}

Venereal Warts

Venereal warts or condyloma acuminata affect the genital or perianal and anal areas. Often spread by sexual contact, the incidence of this

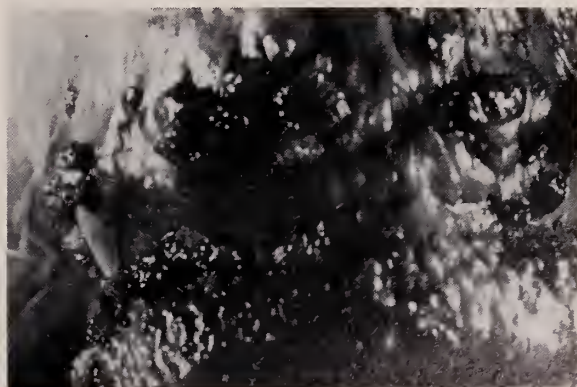


Fig. 1—Condyloma acuminata involving penis.

condition is increasing, particularly in sexually promiscuous adolescents and young adults; both from homosexual and heterosexual encounters (Figures 1 and 2).



Fig. 2—Condyloma acuminata of anal area in homosexual.

Treatment includes painting the warts with 25% podophyllum resin, electrosurgery or surgery. Topical Fluorouracil may clear stubborn warts.

Molluscum Contagiosum

Molluscum contagiosum is a form of wart tumor also caused by cutaneous inoculation of viral bodies. These warts present as smooth, pink, dome-shaped umbilicated papules (Figures 3). Any cutaneous surface may be affected, but sites of predilection include the face, hands, chest, axillary areas, genitalia, and perianal areas. Children and teenage persons are most commonly afflicted. Molluscum warts may also spread by sexual contact.



Fig. 3—Molluscum contagiosum.

Treatment includes curettage, chemosurgery, cryosurgery, and electrosurgery.

Herpes Simplex

Recurrent herpes simplex is a common cutaneous viral infection in all age groups. Increasing genital infections (herpes progenitalis) may relate to increasing promiscuity⁷ (Figure 4). Recurrent grouped vesicles, sometimes painful, erode and become crusted in a few days. Differential diagnosis must include primary syphilis. Smears may reveal the characteristic giant cells and inclusion bodies and viral cultures may identify the viral agent.

Treatment with topical idoxuridine⁸ or photodynamic inactivation with dyes such as neutral red dye⁹ may help resolve and prevent recurrent infection.



Fig. 4—Herpes simplex progenitalis.

Pediculosis Pubis

Infestation with phthirus pubis or the "crab louse" may cause much itching and secondary infection in the pubic or other hairy areas. Usually spread by sexual contact, this infestation may accompany other venereal diseases. Current increased promiscuity has caused a resurgence of this infection.

Diagnosis is confirmed by finding the small, dark gray louse at the base of the hair and locating the nits attached to the hair shaft (Figure 5).

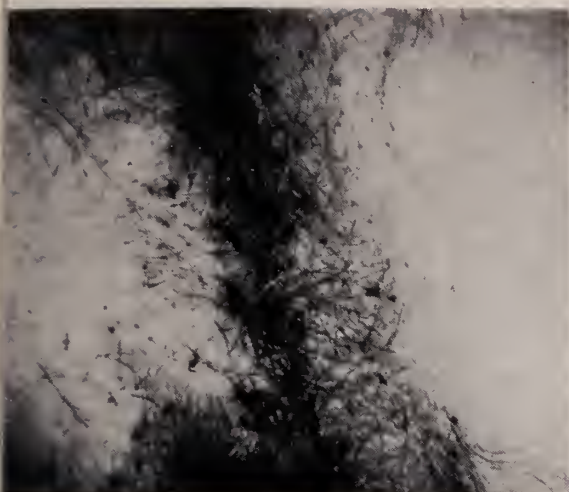


Fig. 5—Pediculosis pubis showing small brown lice at base of hairs.

Treatment with gamma benzene hexachloride (Kwell cream, lotion or shampoo) is effective.

Venereal Diseases

It is not the purpose of this paper to discuss the usual venereal diseases. Syphilis, gonorrhea, chancroid, lymphogranuloma venereum, and granuloma inguinal may all certainly develop in adolescents. These infections must be considered not only in all genital ulcerations and vaginal and urethral discharges but in perianal and anal sores, venereal warts, proctitis, mouth and throat lesions, and suspicious skin eruptions.¹⁰

Skin Markers in Drug Abuse

Cutaneous manifestations in the drug abuser, particularly from injections of heroin, may be valuable clues to the physician.^{11,12} In the adolescent who appears disoriented, incoherent, or comatose, locating such skin signs may be crucial.

Skin infections at sites of injections of drugs include impetiginous and ecthymatous lesions, ab-

cesses or ulcers. Contaminated needles or materials added to dilute the drug may cause the infection. Tissue reaction to injected materials may also lead to secondary infection. This is particularly seen with quinine and sugar fillers. Occasionally severe necrosis ensues.¹³ Ulcers may develop over sclerosed or infected blood vessels. Linear hyperpigmented streaks on antecubital fossae, forearms, wrists, hands, and feet may represent needle tracks. Discrete hyperpigmented depressed skin lesions develop in areas of subcutaneous injections of heroin, the so-called "pop" scars. These may result in hypertrophic scars or keloids.

Chronic edema of the hands from thrombophlebitis or lymphedema may follow recurring infections. Generalized or localized pruritus occasionally follows heroin injection. Jaundice and gynecomastia secondary to hepatitis may also develop.

Other skin signs include: increased pigmentation in sun exposed areas, linear bands of pigmentation from pressure of a tourniquet, excoriations, tattooing of skin, and thermal burns from cigarettes.¹²

Conclusion

Contemporary life styles have influenced the incidence of many skin diseases of the adolescent. Several reports indicate increased incidence of syphilis, gonorrhea, and chancroid in the adolescent. To these must be added warts, condyloma acuminata, molluscum contagiosum, herpes simplex, and pediculosis pubis.

Drug abuse, particularly of those drugs injected into the skin or blood vessels, may be suspected with certain patterns of skin infections or scarring. Skin findings may contribute an important clue to the clinician in diagnosing drug-related problems.

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Historic Hospitals

THE MASSACHUSETTS GENERAL HOSPITAL



The Bulfinch Building, Massachusetts General Hospital. The Ether Dome can be seen protruding above the four central chimneys. (Courtesy Massachusetts General Hospital.)

Visitors to Boston are often invited to admire a number of historic buildings designed by Charles Bulfinch, the area's first native-born architect. The last of Bulfinch's buildings in Boston, completed in 1824, is the Massachusetts General Hospital (MGH). While the first American hospital to boast of plumbing and central heating, its most famous feature is a skylighted surgical amphitheater familiar throughout the world as the "Ether Dome". Here on October 16, 1846, one of the hospital's cofounders, Dr. John C. Warren, excised a tumor of the jaw in the first public demonstration of ether anesthesia. The Ether Dome, now designated by the Department of the Interior as a national historic landmark, is still used as a hospital conference room.

The Bulfinch Building was situated in old Boston's West End on the Charles River Flats, about 40 yards from the river, where patients were often transported by boat. The Flats have since been filled in and the Bulfinch Building is surrounded by a modern 1000-bed complex which allows the MGH to maintain its position among the world's foremost hospitals.

While the hospital's history is not the lengthiest in the United States, it may well be the most illustrious. Besides pioneering in anesthesia the MGH led in the introduction of antiseptic and aseptic surgical techniques in the United States. In the 1880's an MGH pathologist, Dr. Reginald H. Fitz, was the first in modern times to identify the source of appendicitis, and he gave the disease its name. The hospital's surgical staff led in the development of its primary treatment, the appendectomy.

Other medical leaders associated with MGH, and the list is far from complete, were: Dr. James H. Wright of Wright's Stain fame, Dr. J. Howard Means, pioneer in diagnosis and treatment of thyroid diseases, Dr. Fuller Albright, investigator of hyperparathyroidism and other metabolic diseases of bone, and Dr. Richard C. Cabot, who developed at the hospital the world's first social service department. Another of Dr. Cabot's contributions was the development of the clinical pathological conference as a method of medical teaching. The Clinical Path Conferences of the Massachusetts General are not only the oldest series, but, are still published in the *New England Journal of Medicine*, the most widely read in the world.

Warren L. Kump, M.D.
Minneapolis, Minnesota

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Letters to the Editor

MINNESOTA MEDICINE November color photo and story, that's corn to me . . . not wheat. How many notes like this came in? It proves the readers look—if they know the difference.

Burton P. Grimes, M.D.
St. Peter, Minnesota

Dr. Wendland, I fear, is going to catch some heat on his "wheat," so beautifully photographed on the November MINNESOTA MEDICINE cover. Any Minnesota doctor who grew up on a farm or practiced in a rural area will quickly spot it as corn.

The title too, is slightly misleading; temporally speaking. Judging by the length of the shadows of the corn shocks, and the number and color of the sumac leaves in the foreground it should be "October Song."

Some of the heat must of course be directed to the editor of the caption.

L. H. Hammar, M.D.
Mankato, Minnesota

In the last issue of MINNESOTA MEDICINE for November 1972, there is a beautiful photograph on the cover by John P. Wendland entitled "November Song." On Page 1015 in this issue, there is an editorial about the photograph and it is stated "this particular field of wheat as this method of harvesting wheat is disappearing from the farm scene. Most of this is done by combine."

Somehow here a field of corn became confused with a field of wheat. The picture on the cover is obviously a field of corn that has been cut and placed in shocks.

Wheat is harvested in August and is sometimes placed in shocks but they have an entirely different appearance. A wheat field does not appear in rows as does a corn field.

I know Dr. Wendland and I can't believe that he could be this confused or possibly so much in need of a refraction.

A. G. Sherman, M.D.
Albert Lea, Minnesota

If the November cover photograph "November Song" isn't a field of corn shocks, I'll quit eating cracked-wheat bread and switch to corn pone.

D. A. Johnson, M.D.
Litchfield, Minnesota

It is encouraging to see that not all doctors are "city slickers" and that a great many of them apparently know a shock of wheat from a shock of corn.

Apparently there is a lot of interest in the cover of MINNESOTA MEDICINE also.

I wish that we could say that we had called the shocks wheat just to see how many readers were paying attention, but alas, I had not carefully checked the slide for several years and in my telephone diagnosis called it wheat. It just shows you the danger of giving advice over the telephone. As an old Nebraska farmer, it is obvious that the shocks are corn.

John P. Wendland, M.D.
Minneapolis, Minnesota

Dr. Reece's article on "Healthcaremanship"* was excellent and timely indeed. Equipped with new knowledge on Windfoggery, Double Dawdles, and literary "Buzz Bombs," I found them in the Supplement to the same issue of MINNESOTA MEDICINE sponsored by NRMP (Northlands Regional Medical Program, Inc.). There it is written: "It (RMP) will be called upon increasingly to advance the Science of Applied Research and Development, to promote the fields of Health Care, Economics and Health Care Systems Development, and to use its multi-disciplined staffs to provide evaluation studies and consultations for other organizations."

Holy bureaucracy, I can feel the wind and cannot see for the fog. Spare me the details, please let me have it straight! What is meant by "advancing the Science of Applied Research and Development?" Do I hear a fog horn when it is said that there will be "jurisdictional changes, and RMP will undoubtedly be one of them?" I scare easily. It may mean: "Watch out, fellow, here comes the Government." But why should I scare when the "Smart Buzz Bombs" fall? Isn't it a nurse who tells me in so many words and paragraphs on Page 51 that she would like our Junior Colleges to be in charge of Continuing Education for Nurses? After all, nurses help sick people get well and also help the doctors. I work with them all the time. A nurse should not scare me by throwing "Buzz Bombs," kicking me with Saxon Sidesteps, or waylaying me with Paragraph Parries and Finishing Finesses.

When I look at this Special Issue and at the gifted people who composed it, I like to quote the Godfather: "Let's make 'em an offer they cannot refuse: Come back to Medicine. It is rewarding, fulfilling, and not dangerous at all!"

H. W. Heupel, M.D., Ph.D.
Minneapolis, Minnesota

*Minnesota Med 55:1141, 1972.

Denial of Hospital Staff Privileges

A physician was denied hospital staff membership and admitting privileges by the hospital staff. The physician in question had a poor work history along with dismissal from another hospital staff because of incompetence. The hospital staff requested current references with an evaluation of competence from the head of the hospital whose facilities had been previously used. The physician failed to furnish the requested references.

The patient then instituted an action to compel the hospital to admit her to its medical staff. The court held that the hospital was a private hospital and could refuse staff privileges on any ground it deemed sufficient.

The physician contended that private hospitals should admit any licensed physician to use their facilities. The court then upheld the hospital in their refusal to grant admitting privileges to this physician.

Theodore A. Peterson, M.D.
Minneapolis, Minnesota

Rao v. Board of County Commissioners (Pierce), 497 P.2d 591 (Wash. Sup. Ct., June 1, 1972). The Citation 26:1, October 15, 1972.

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Contraindications: Hypersensitivity to any component; concurrent MAO inhibitor therapy; severe hypertension; bronchial asthma; coronary artery disease; stenosing peptic ulcer; pyloroduodenal or bladder neck obstruction. Children under 6.

Warnings: Caution patients about activities requiring alertness (e.g., operating vehicles or machinery). Warn patients of possible additive effects with alcohol and other CNS depressants.

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Effect on PBI Determination and I^{131} Uptake: Isopropamide iodide may alter PBI test results and will suppress I^{131} uptake. Substitute thyroid tests unaffected by exogenous iodides.

Precautions: Use cautiously in persons with cardiovascular disease, glaucoma, prostatic hypertrophy, hyperthyroidism.

Adverse Reactions: Drowsiness, excessive dryness of nose, throat or mouth; nervousness; or insomnia. Also, nausea, vomiting, epigastric distress, diarrhea, rash, dizziness, weakness, chest tightness, angina pain, abdominal pain, irritability, palpitation, headache, incoordination, tremor, dysuria, difficulty in urination, thrombocytopenia, leukopenia, convulsions, hypertension, hypotension, anorexia, constipation, visual disturbances, iodine toxicity (acne, parotitis).

Supplied: Bottles of 50 capsules.

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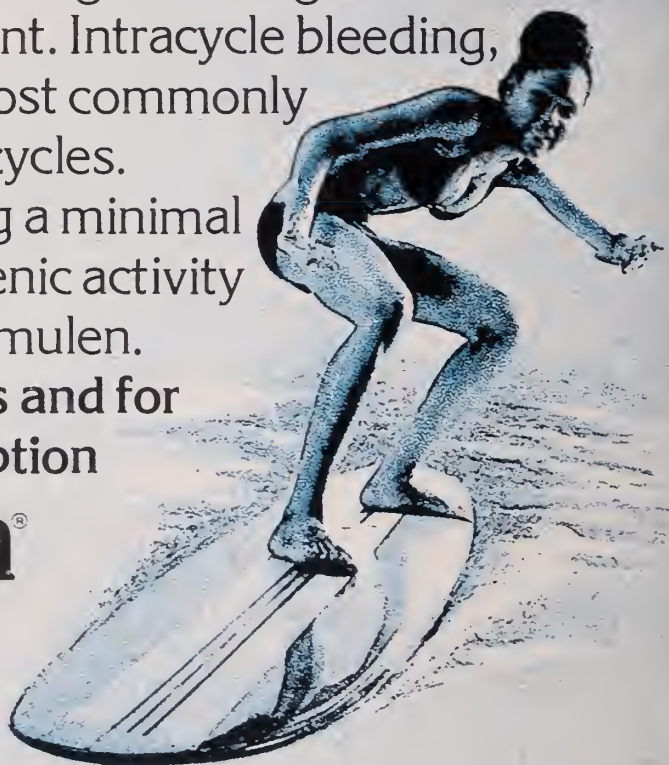
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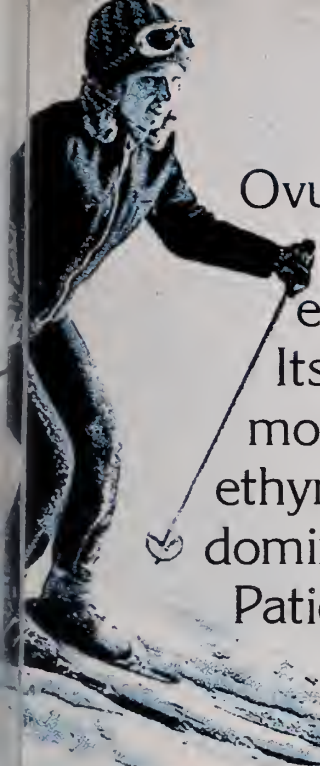
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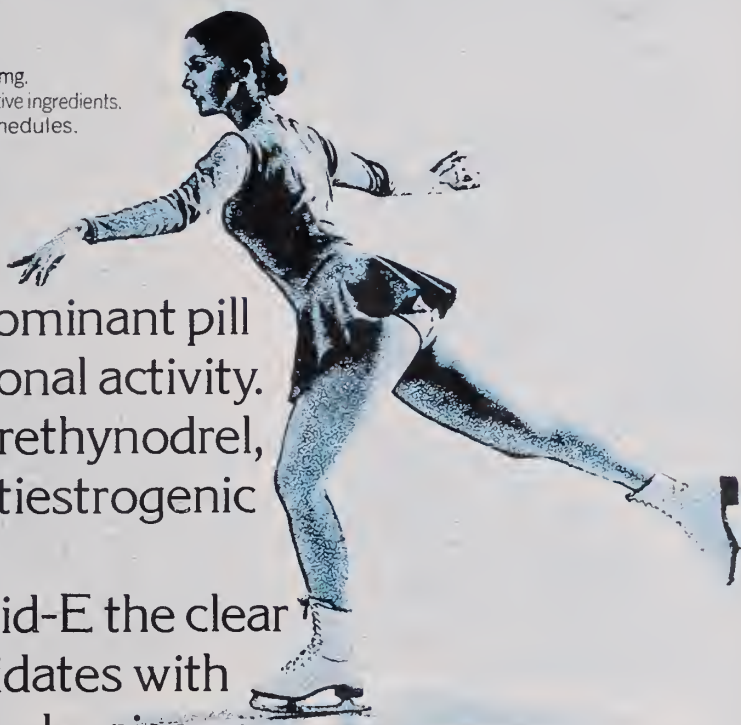
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Actions—Ovulen and Demulen act to prevent ovulation by inhibiting the output of gonadotropins from the pituitary gland. Ovulen and Demulen depress the output of both the follicle-stimulating hormone (FSH) and the luteinizing hormone (LH).

Special note—Oral contraceptives have been marketed in the United States since 1960. Reported pregnancy rates vary from product to product. The effectiveness of the sequential products appears to be somewhat lower than that of the combination products. Both types provide almost completely effective contraception.

An increased risk of thromboembolic disease associated with the use of hormonal contraceptives has now been shown in studies conducted in both Great Britain and the United States. Other risks, such as those of elevated blood pressure, liver disease and reduced tolerance to carbohydrates, have not been quantitated with precision.

Long-term administration of both natural and synthetic estrogens in sub-primate animal species in multiples of the human dose increases the frequency of some animal carcinomas. These data cannot be transposed directly to man. The possible carcinogenicity due to the estrogens can be neither affirmed nor refuted at this time. Close clinical surveillance of all women taking oral contraceptives must be continued.

Indication—Ovulen and Demulen are indicated for oral contraception.

Contraindications—Patients with thrombophlebitis, thromboembolic disorders, cerebral apoplexy or a past history of these conditions, markedly impaired liver function, known or suspected carcinoma of the breast, known or suspected estrogen-dependent neoplasia and undiagnosed abnormal genital bleeding.

Warnings—The physician should be alert to the earliest manifestations of thrombotic disorders (thrombophlebitis, cerebrovascular disorders, pulmonary embolism and retinal thrombosis). Should any of these occur or be suspected the drug should be discontinued immediately.

Retrospective studies of morbidity and mortality conducted in Great Britain and studies of morbidity in the United States have shown a statistically significant association between thrombophlebitis, pulmonary embolism, and cerebral thrombosis and embolism and the use of oral contraceptives. There have been three principal studies in Britain^{1,2} leading to this conclusion and one³ in this country. The estimate of the relative risk of thromboembolism in the study by Vessey and Doll¹ was about sevenfold, while Sartwell and associates⁴ in the United States found a relative risk of 4.4, meaning that the users are several times as likely to undergo thromboembolic disease without evident cause as nonusers. The American study also indicated that the risk did not persist after discontinuation of administration and that it was not enhanced by long-continued administration. The American study was not designed to evaluate a difference between products. However, the study suggested that there might be an increased risk of thromboembolic disease in users of sequential products. This risk cannot be quantitated, and further studies to confirm this finding are desirable.

Discontinue medication pending examination if there is sudden partial or complete loss of vision, or if there is a sudden onset of proptosis, diplopia or migraine. If examination reveals papilledema or retinal vascular lesions medication should be withdrawn.

Since the safety of Ovulen and Demulen in pregnancy has not been demonstrated, it is recommended that for any patient who has missed two consecutive periods pregnancy should be ruled out before continuing the contraceptive regimen. If the patient has not adhered to the prescribed schedule the possibility of pregnancy should be considered at the time of the first missed period.

A small fraction of the hormonal agents in oral contraceptives has been identified in the milk of mothers receiving these drugs. The long-range effect to the nursing infant cannot be determined at this time.

Precautions—The pretreatment and periodic physical examinations should include special reference to the breasts and pelvic organs, including a Papanicolaou smear since estrogens have been known to produce tumors, some of them malignant, in five species of sub-primate animals. Endocrine and possibly liver function tests may be affected by treatment with Ovulen or Demulen. Therefore, if such tests are abnormal in a patient taking Ovulen or Demulen, it is recommended that they be repeated after the drug has been withdrawn for two months. Under the influence of progestogen-estrogen preparations pre-existing uterine fibromyomas may increase in size. Because these agents may cause some degree of fluid retention, conditions which might be influenced by this factor, such as epilepsy, migraine, asthma, cardiac or renal dysfunction, require careful observation. In breakthrough bleeding, and in all cases of irregular bleeding per vaginam, nonfunctional causes should be borne in mind. In undiagnosed bleeding per vaginam adequate diagnostic measures are indicated. Patients with a history of psychic depression should be carefully observed and

the drug discontinued if the depression recurs to a serious degree. Any possible influence of prolonged Ovulen or Demulen therapy on pituitary, ovarian, adrenal, hepatic or uterine function awaits further study. A decrease in glucose tolerance has been observed in a significant percentage of patients on oral contraceptives. The mechanism of this decrease is obscure. For this reason, diabetic patients should be carefully observed while receiving Ovulen or Demulen therapy. The age of the patient constitutes no absolute limiting factor, although treatment with Ovulen or Demulen may mask the onset of the climacteric. The pathologist should be advised of Ovulen or Demulen therapy when relevant specimens are submitted. Susceptible women may experience an increase in blood pressure following administration of contraceptive steroids.

Adverse reactions observed in patients receiving oral contraceptives—A statistically significant association has been demonstrated between use of oral contraceptives and the following serious adverse reactions: thrombophlebitis, pulmonary embolism and cerebral thrombosis.

Although available evidence is suggestive of an association, such a relationship has been neither confirmed nor refuted for the following serious adverse reactions: neuro-ocular lesions, e.g., retinal thrombosis and optic neuritis.

The following adverse reactions are known to occur in patients receiving oral contraceptives: nausea, vomiting, gastrointestinal symptoms (such as abdominal cramps and bloating), breakthrough bleeding, spotting, change in menstrual flow, amenorrhea during and after treatment, edema, chloasma or melasma, breast changes (tenderness, enlargement and secretion), change in weight (increase or decrease), changes in cervical erosion and cervical secretions, suppression of lactation when given immediately post partum, cholestatic jaundice, migraine, rash (allergic), rise in blood pressure in susceptible individuals and mental depression.

Although the following adverse reactions have been reported in users of oral contraceptives, an association has been neither confirmed nor refuted: anovulation post treatment, premenstrual-like syndrome, changes in libido, changes in appetite, cystitis-like syndrome, headache, nervousness, dizziness, fatigue, backache, hirsutism, loss of scalp hair, erythema multiforme, erythema nodosum, hemorrhagic eruption and itching.

The following laboratory results may be altered by the use of oral contraceptives: hepatic function, increased sulfobromophthalein retention and other tests, coagulation tests, increase in prothrombin, Factors VII, VIII, IX and X, thyroid function, increase in PBI and butanol extractable protein bound iodine and decrease in T₃ uptake values, metyrapone test and pregnanediol determination.

References: 1. Royal College of General Practitioners, Oral Contraception and Thromboembolic Disease, J. Coll. Gen. Pract. 13:267-279 (May 1967). 2. Inman, W. H. W. and Vessey, M. P., Investigation of Deaths from Pulmonary, Coronary, and Cerebral Thrombosis and Embolism in Women of Child-Bearing Age, Brit. Med. J. 2:193-199 (April 27, 1968). 3. Vessey, M. P. and Doll, R., Investigation of Relation Between Use of Oral Contraceptives and Thromboembolic Disease: A Further Report, Brit. Med. J. 2:651-657 (June 14, 1969). 4. Sartwell, P. E., Masi, A. T., Arthes, F. G., Greene, G. R., and Smith, H. E., Thromboembolism and Oral Contraceptives: An Epidemiologic Case-Control Study, Amer. J. Epidemiol. 90:365-380 (Nov) 1969.

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Editorials

Adolescent Medicine—Where Are the Adolescents?

ADOLESCENCE IS AN overlabeled period of life. Long hair and well worn blue jeans—like a badge—quickly bring to mind the term “teenager.” Although this group may be over-identified in the population at large, medically they are overlooked. Doctors’ waiting rooms are almost devoid of teenagers, in spite of a population of adolescents numbering 30 million. Where are they to be found?

It is true that American youngsters are considered to be the healthiest in the world, yet they have pronounced medical problems. As attested to by the special articles in this issue of MINNESOTA MEDICINE, suicide is on the increase in this age group. Venereal disease has increased tenfold in the past 15 years, particularly in the adolescent group. One in six unmarried adolescent girls becomes pregnant. Drug abuse is epidemic in junior and senior high school students.

The adolescent has until recently received little attention as to specific health needs and problems. An orderly progression from pediatric care to generalized or specialized adult medical care was lacking. For the age span of 12-20 years, teenagers were either seen by their childhood physician or their parent’s physician. At present medical care for teenagers is channeled into two prevalent movements—both with their shortcomings. The first is the Adolescent Clinic and Hospital Unit. This was pioneered by Dr. J. Roswell Gallagher at Children’s Medical Center in Boston as recently as 1951. Its purpose was to integrate an understanding of the disease processes, physiology, environmental forces, as well as the intrinsic

hopes, fears and concerns intrinsic to the adolescent.¹ Dr. W. A. Daniel, Jr.,* who is also well known in this field, presents an article in this issue attesting to the need to consider the adolescent with an approach defined in terms of his specific needs. The gross deficiency of the Adolescent Clinic movement lies in that there are only 70 such units in the country. The Society for Adolescent Medicine founded as recently as 1968 has only 450 members.

The second movement is that of the Free Clinics. Current figures estimate that there are 200 in the country serving approximately 2,000,000 patients per year, chiefly the young.² The merit of these clinics lies in reaching large numbers of patients who will not go elsewhere for medical care. These clinics have evolved skills in methods of speaking the language of and communicating with youth. Their referrals are largely from other adolescents.

One of their shortcomings is that because of limited budgets and facilities they are forced to operate in a borderline way. Another is that they lack continuity of care. One prediction is that Free Clinics are an interim problem-solving mechanism and will eventually be absorbed into regular medical channels.

The adolescent by legislation now comes into greater choice of his own medical care. He can be treated without parental consent. There is one important resource readily available but rejected by many adolescents and that is the family physician. It is he who knows the previous medical history, the family history and can give continuity of care. However, according to the way the adolescent feels, this may be an interfering factor. Many

See page 99.



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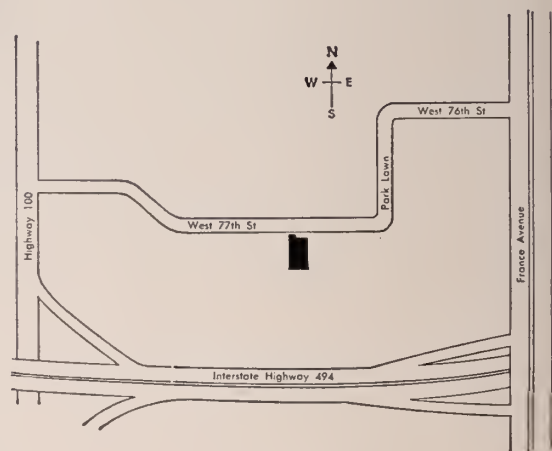
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adolescents think they cannot approach their family physician for birth control information or with a pregnancy without being reproved or lectured. In order to bridge the gap and reach this group medically, it is the family physician who must show the capability to re-examine and define his approach. Whether he agrees with their point

of view or not he will have to become aware of the sincere concerns of the young—ecology, pollution, population control. He will have to develop and extend his communication skills with the adolescent. Care of the young can be distressing, but it is refreshing.

Dorothy M. Bernstein, M.D.
Guest Editor

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1. Gallagher JR: Medical care of the adolescent patient. Meredith Publishing Co. 2-5, 1966.

2. Eisenberg H. The free clinic movement. *Med Econ* 95-130, 1972.

Suicide Attempts: The Wish to Live

DEPRESSIVE DISORDERS are frequently overlooked in adolescence, partly because the extremes of normal adolescent behavior often obscure and delay the recognition of clear pathology. One certain means the adolescent has of alerting others to his plight is the suicidal attempt. There are approximately six to ten suicide attempts for every actual suicide in the general population. In the adolescent age range this ratio is estimated between 50 and 100 to one.

The conscious thinking of the suicidal person is that he is in an unbearable situation from which there is no alternative means of escape. Typically, his attempt is the end stage of a long-unfolding process involving early object losses, family conflicts, faulty means of coping with stress and current precipitating events which awaken prototypal feelings of loss, worthlessness, guilt and rage. His bewilderment is reflected in the feelings of perplexity and helplessness arising in those who attempt to help him. In this issue Cline* points out the importance of taking every suicidal attempt seriously and the need to learn as much as possible about the background and present conflicts of the patient.

The suicidal adolescent needs aid in reconciling

incompatible motives: the wish to die and express his sense of basic badness and the longing to survive and demonstrate his desirability and worth. While his attempt is often viewed as expression of his loneliness and desire to die, it may also be a plea to others to convince him he is worth keeping alive. The physician can help him realize that there is hope apart from his self-destructive resolve.

In addition, the adolescent who attempts suicide has often been striving for some time to communicate with some significant persons, usually his parents, but unable because of some impasse. Parents often express total unawareness of their child's distress, or find it difficult to appreciate his degree of despair. For this reason talking with the parents is an equally important part of the therapeutic intervention. The therapist must use every available means to insure that the patient's covert communication has been openly expressed and understood, and that both parties are able to share their obstructed feelings.

As with most problems in psychiatry, the internal psychological struggles cannot be resolved practically apart from giving simultaneous attention to the struggles of human relationships.

S. Wendell Obetz, M.D.
Rochester, Minnesota

*See page 111.

Current Dimensions of the Drug Scene

CURRENT TRENDS in drug misuse, particularly among adolescents is a matter of grave concern to all physicians, and in defining their dimensions Dr. Dorothy Bernstein* has done us a great service. No matter how often the problem is mentioned in the lay press or in professional journals, we are required to extrapolate the often sensational sta-

tistics to our own practices, wherein lie some of the most fertile possibilities for preventive action. Increased usage in the 12 to 15 year old group, and increased severity of problems in those aged 17 to 19 should alert us to more careful regulation of amphetamines and barbiturates prescribed for the parents of these young drug experimenters. since initial supplies of these drugs frequently

*See page 108.

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come from family medicine cabinets. Additional preventive efforts to help both adults and adolescents cope with ordinary life stresses without resort to drugs show promise of preventive benefit, as it is well known that about 5% of the users of any comforting drug, whether it be alcohol, heroin, or amphetamine, go on to chronic misuse. The answers to the misuse problem are complex,

embracing social factors, drug availability, and individual psychopathology, and Dr. Bernstein's prescription for prompt family interviewing where adolescent drug use is suspected deserves the careful attention of all of us, as such action can be truly preventive.

Richard W. Anderson, M.D.
Minneapolis, Minnesota

Pregnancy: An Adolescent Crisis

MECKLENBURG* has focused on an urgent socio-medical problem in an emphatic manner. Rightly so, for as he has so graphically described, it is a major health problem and increasing. Reliance on parental guidance, church influence, elective education in the school system, and civic organizational efforts has proved inadequate. This is not meant to fault these efforts, for they have had some impact. A frequent comment from a concerned parent is "I tried, but (he or she) just won't listen to me anymore." This possibly is part of parental-sibling communication breakdown. However, an even more important factor is the normal adolescent drive for independence from parental influence.

Adolescent pregnancies are an important aspect of a broader area—adolescent health. This age group has health problems peculiar to it. Only recently has attention begun to be focused

on their health needs. Education provides only a part of the need. As the author points out, social factors contribute. Thus, an adequate approach must include a broad, continuing support program.

The problem justifies centralized planning, compulsory health education through all levels of the educational system, working in cooperation with, and part of, regional adolescent centers staffed with medical personnel, qualified to evaluate the emotional as well as the physical problems, psychologists, social counselors, clergy, employment counselors and legal advisors. Short term and long range guidance programs would be needed. Such a massive program would obviously need central control and administration and government funding. As the author states, appropriate governmental groups have not faced up to the need.

Morris S. Rothenem, M.D.
Minneapolis, Minnesota

Understanding Teenagers

THE TOPIC OF UNDERSTANDING teenagers has been fairly well exhausted by numerous authors. Yet the paper presented ably by Westman* testifies to our continued striving for answers regarding this perplexing period.

Westman's divisions of early, middle and late adolescence seem somewhat restrictive. With increasingly earlier onset of menarche many *early* adolescents are in the 11-12 year age level. And who can define where *late* adolescence ends? A fourth category of *post-adolescence* would deal with the individual whose need for continued education into the late twenties leaves him in limbo between adolescence and adulthood.

As Westman points out, the end of adolescence "may be deferred . . . until adult responsibilities

are formally assumed." But this period of deferral or waiting is filled with impersonal isolation, unproductivity, and often depression. Not contributing constructively to society for a prolonged period of time can lead an adolescent to assume the roles of critic and political activist. At least these activities bring a sense of doing something.

When "we are both afraid of and threatened by young people" the generation gap cries out for improved communications. How many of us feel fully comfortable speaking with teenagers, individually or in groups? But communicate with them we must. As Westman clearly summarizes, one day they will not only no longer need us, but will eagerly take our place. And then they will be adults and the process will begin again of understanding teenagers.

James G. Cardie, M.D.
Minneapolis, Minnesota

*See page 94.

*See page 101.

The Adolescent with Venereal Disease

DR. MAHAN's paper contains interesting and true points, and his suggestions are to be taken seriously. At the Teen-Age Medical Service we do not make a definite diagnosis of gonorrhea on a Gram stain of a penile discharge if there are mixed types of bacteria on the slide. But if the slide contains only intracellular diplococci, we can state that he probably has gonorrhea, and on this basis we treat him before the return of the culture. All of our males have cultures taken.

Serologies are drawn at four to six month intervals on sexually active males and females.

In working with adolescents, I want to alert physicians to the following:

1. Fifty percent of the population in the United States is under the age of 25. This group comprises an important part of society and a large segment of the patient population and is growing larger.
2. Physicians need to understand adolescent sexual behavior.
3. Physicians need to know about alternative

health care, such as mobile clinics, free clinics, contact centers for runaways, neighborhood youth centers, and the therapeutic counseling for drug abusers.

4. Physicians need to know the legislative status of the adolescent in Minnesota, as well as changes to this law which would prevent us from caring for the adolescent with our best medical judgment.

Physicians who are aware of these things should consider joining the Society for Adolescent Medicine. This includes all specialties if they work with youth. The Society for Adolescent Medicine has scheduled their meetings as follows:

<i>Spring</i>	<i>Fall</i>
1973—Los Angeles	1973—Chicago
1974—Cincinnati	1974—San Francisco
1975—Toronto	1975—Washington, D.C.

I urge you to learn more about how you can prepare adolescents and their parents to approach the problems in a sensible and mature fashion so that the dignity and respect of youth can be maintained, as well as the doctor-patient relationship.

Elizabeth Jerome, M.D.
Minneapolis, Minnesota

See page 105.

Cover Sculpture

"Nuclear Group"

The sculpture on this month's issue of MINNESOTA MEDICINE accompanies the Journal's theme of medicine and youth. The metallic figure grouping is by Dr. Dorothy Bernstein, a Minneapolis child and adolescent psychiatrist.

Sculpture, pottery, jewelry and graphics are media she has explored. She is past president of the American Psychiatric Art Association and in 1970 won the best of show award at the annual exhibit in San Francisco. At present her efforts are directed to establishing an active local chapter of this organization.

The photograph of the sculpture was done by Mark Bernstein, who is a third year student at the University of Minnesota Medical School.

Toxic Epidermal Necrolysis

(Scalded Skin Syndrome)

Associated with Staphylococci

TOXIC EPIDERMAL necrolysis is known in dermatology to occur in adults and children. The accumulation of more case reports; has suggested that this entity is not a definite disease but rather a clinical picture with multiple causations. On a visit to the Department of Dermatology at the University of Minnesota Lyell, himself, stated this view. In addition, to coagulase positive staphylococcus, various drugs and immunizations (tetanus, diphtheria, polio) have been associated with this condition. Also, cases have been reported where no definite cause could be identified.

In the paper by Saxena and Sethi* there were no fatalities. Unfortunately, this is not always the case. This entity may manifest itself as a rapidly progressive illness with a fatal outcome. It should be emphasized that therapy must take into consideration the possible cause. Supportive care

similar to that given to burn patients is indicated, as well as therapy directed at the causative agent, if known, (e.g. staphylococcus). The use of corticosteroids in those cases due to drugs has shortened the course. However, patients have recovered without the latter and their use would have to be tempered with the knowledge of the probable cause as well as the patient's condition.

In reading the clinical descriptions of the cases presented by Saxena and Sethi, one is reminded of a disease long known in pediatric literature—Dermatitis Exfoliativa Neotorum (Ritter's Disease). The latter has long been known to be caused/or associated with group 2 staphylococcus infection. Most authorities now agree that a differential between Ritter's Disease and toxic epidermal necrolysis, when caused by staphylococcus, cannot be made in an infant and may be identical.

Willard C. Peterson, M.D.
Minneapolis, Minnesota

*Saxena KM and Sethi AS: Toxic epidermal necrolysis (scalded skin syndrome). Minnesota Med 54:1093, 1972.

Early Postpartum Insertion of Intrauterine Contraceptive Device

PATIENTS IN THOSE segments of the population who eschew the traditional postpartum examination and concomitantly the opportunity to avail themselves of the more effective means of contraception are the subject of continuing study around the world. Insertion of an intrauterine device prior to hospital dismissal attempts to utilize the acknowledged increased motivation for contraception by patients in the immediate postpartum period.

Several investigators have compared the complication rates of IUCD insertion within five days

of delivery to those of insertion at six or more weeks postpartum. Hemorrhage, infection, and perforation are not increased by early insertion. As confirmed by the report of Diamond and Freeman (in the January issue*), expulsion is the major disadvantage of early postpartum insertion of the commonly used devices.

Hopefully, more extensive studies will not show an increase in the low (4%) expulsion rate. Rashbaum and Wallach have reported for the petal IUCD which would seem to hold considerable promise as a device for puerperal insertion in the future.

Charles R. Fish, M.D.
Rochester, Minnesota

*Diamond RA and Freeman DW: Insertion of intrauterine devices in the early postpartum period. Minnesota Med 55:49, 1973.

Dr. Fish is with the Department of Obstetrics and Gynecology, Mayo Clinic.

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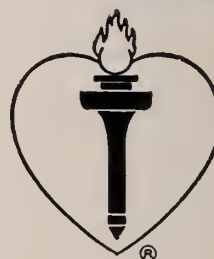
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—George Sarton, from "The History of Medicine Versus the History of Art"

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Opinion

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Opinion & Dialogue

Doctor of Medicine

Louis Lasagna, M.D.
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Obviously, many drugs are given concomitantly. Whether it makes sense to combine medications in one preparation, be it capsule, tablet, or liquid, is a question that can be answered only by examining the advantages and disadvantages in the individual case.

Among the advantages is, first of all, convenience. The more medications that are taken concurrently and the more complicated the directions, the less likely the patient is to take medications accurately. From the standpoint of convenience and accuracy, and economy as well, you can make an important case for putting medications together in one preparation, as long as they are compatible.

By the same token, when you prescribe a properly tested and rational combination, you should have less worry about pharmaceutical or pharmacological compatibility — and about reasonable dosage ratios as well. Compatibility of the formulation should be demonstrated in the laboratory and clinic before the product is available for prescription—which is more than can usually be said for

the physician's own spontaneous creations. And, the dosage ratios employed in rational precompounded combinations are designed to meet the needs of substantial numbers of "typical" patients.

There is no doubt that many "atypical" patients are to be found, and for them the prefabricated combination must be rejected. But that hardly argues for eliminating rational combinations from the market. Think, for example, of the problems that would arise if the components of widely accepted combinations, like the oral contraceptives and the diuretic-antihypertensives, always had to be prescribed, purchased and ingested separately.

One disadvantage that comes to mind is some doctors' unawareness of the ingredients a given combination contains. For example, a doctor might know that a patient is allergic to aspirin but forget that a certain analgesic mixture, which he knows only by its trade name, contains aspirin. His prescription, then, causes considerable discomfort, to say the least. This problem is a function of physician education, rather than of combination therapy as such. Improving doctors' knowledge about all medicaments they prescribe is a problem that deserves tackling on its own.

Another accusation leveled at combination drugs is that they encourage sloppiness of diagnosis and treatment. In many cases, however, a combination may prove to be the most effective choice. A good ex-

ample of the usefulness of combinations appears in a recent article in the *Journal of Chronic Diseases* on the efficacy and side effects of an antihypertensive containing three ingredients, in which the track records of the combination drug and the individual ingredients were compared. Interestingly enough, whether the drugs were given individually or together, incidence and severity of side effects were the same. But blood pressure control was invariably better when the drugs were taken in one combination tablet than when they were taken separately (in "titratable" dosage) or in two or three different tablets.

Deciding which combinations constitute rational therapy obviously leads to a discussion of who is to determine which should be used and which should not. Realistically, I think combinations should be evaluated somewhat differently if they are old and established or new and untried.

In today's regulatory atmosphere, there is no possibility of a new combination being put on the market without a substantial amount of acceptable evidence in the form of controlled trials that show it to be safe and efficacious. On the other hand, I believe a different set of standards should apply to combination preparations that have been around for a long time. In other words, physician acceptance over a long period should be given some weight as evidence of the efficacy and safety of these drugs.

The FDA, however, does not seem to share this attitude. It often requires, for these older products, controlled trials that will monopolize the time of already overtired investiga-

tors and cost a great deal of money. I wish we could agree on a "grandfather clause" approach to preparations that have been in for a number of years, that have an apparently satisfactory track record.

For example, I think some of the antibiotic combinations that were taken off the market by the FDA performed quite well. I'm thinking particularly of penicillin-streptomycin combinations that patients—especially surgical patients—were given in injection. This made less discomfort for the patient, less demand on nurses' time, and fewer opportunities for dosing errors. To take such preparation off the market doesn't seem to be good medicine, unless actual usage showed a great deal of harm from the injections (rather than the preparation of the combination).

The point that should be emphasized is that there are both rational and irrational combinations. The real question is, who should determine which is which? Obviously, the FDA must play a major role in making this determination. In fact, I don't think it avoids taking the ultimate responsibility, but it should enlist the help of outside physicians and experts in assessing the evidence used in making the ultimate decision.

Maker of Medicine

V. Clarke Wescoe, M.D.
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If two medications are used effectively to treat a certain condition, and it is known that they are compatible, it clearly is useful and convenient to provide them in one dosage form. It would make no sense, in fact, it would be pedantic, to insist they always be prescribed separately. To avoid the appearance of dandyism, the "expert" denies the combination because it is a fixed dosage form. When the "expert" invokes the concept of fixed dosage form he obscures the fact that single-ingredient pharmaceutical preparations are also fixed dosage forms. By a singular semantic exercise he implies a pejorative meaning to the term "fixed dose" only when he uses it with respect to combinations. What is ignored is the simple fact that only in the rarest of circumstances does any physician attempt to titrate an exact therapeutic response in his patient. It is quite possible that some aches and pains will respond to 500 mg. of aspirin yet that fact does not militate against the usual dose being 650 mg.

The other semantic ploy often called into play is to describe a combination product as rational or irrational.

Take antibiotic mixtures, the source of much of the criticism generated against

combinations generally. Obviously, no one should be exposed willy-nilly to the potential side effects of two or three antibiotics when only one is needed. At the same time there are cases where it is prudent to prescribe more than one. The clinician is the judge in these circumstances, as he should be.

There is no clear definition of the word rational. Most persons, I suppose, would find it synonymous with reasonable, but in many circumstances it may best be defined as the opinion of those in power at the moment.

Other factors govern combination therapy, not the least of which has been its broad use by practicing physicians anxious to achieve convenience in prescribing, to reduce medication error, and to save money for their patients. Combinations clearly have met the test on all three counts.

I have been impressed by studies showing that the rate of error climbs markedly with the number of medications to be taken, even with sophisticated patients. When medically justified, therefore, this factor alone supports the logic of combination therapy.

The cost argument for combinations appears to be irrefutable. In 1971, R. A. Gosselin studied the 71 combination products (excluding oral contraceptives) among the 200 most prescribed drugs. The study found that if all 71 products were discontinued, and if each ingredient in these combinations were prescribed separately, the price of medicines to patients would jump by \$443.2 million on a national basis! At a time when the cost of medical care is under so much fire, it would be nonsensical to boost costs without clearly irre-

futable medical reasons.

The part played by government on this question, of course, is fundamental. The FDA should play a role in determining which combinations are reasonable. That role, as defined by law and regulation, is to ensure that any medication on the market is safe and effective in line with its label claims. Certainly combinations are entitled to as much consideration as single entities—neither more nor less. So long as the addition of one drug to another does not make either less safe, or less effective, so long as they are compatible in a formulation, we have a reasonable product. It makes no sense to recommend the use of two products for certain conditions and to deny their being combined in a single form. An unhappy side effect of the problem concerns the efficacy panel discussions of many products submitted for review. The term "effective, but" has been freely interpreted to mean "ineffective" in toto, regardless of the merit of the individual drugs. This interpretation has placed numerous useful combination products in needless jeopardy.

In reading the actual reports of the review panels, it seems clear that some of the ratings were based less on scientific research and clinical observation than on the "informed" opinions of the panelists. These "informed" opinions were accepted at face value, while

the "informed" opinions of others who had used the products were rejected. All of this put combination products into a sort of scientific never-never land.

It should be kept in mind by all, government as well as others involved in our health care system, that advances in therapy are seldom made in leaps and bounds but rather by small painstaking steps—and that some of these steps have resulted from research in combination drugs as well as with single entities. Given the near-infinite biologic variation in patient response, this is hardly surprising to clinicians. It should not be to regulatory agencies either.

In the end, the practicing physician is in the best position to decide if a particular combination makes sense. Such a decision should not be made exclusively by those whose responsibility for continuing clinical care is limited. Clinicians are the best judges of efficacy because the ultimate proof of any product's effectiveness is acceptance by physicians who have observed its actions in patients over time. The corollary statement may be made about over-the-counter medicines, which would not long survive if they failed to afford the relief the user anticipates. That the antihistamine in a "cold" remedy may not *always* be necessary is no reason to proscribe the combination generally.

Opinion & Dialogue

What is your opinion, doctor?

We would welcome your comments.



The Pharmaceutical Manufacturers Association
1155 Fifteenth Street, N.W., Washington, D.C. 20005



MINOCIN® made the difference in just eight days.*

Clinical Data:

Patient: 47-year-old male.

Diagnosis: Severe pyoderma, left hand.

Culture: *Staphylococcus aureus*, coagulase positive and sensitive to MINOCIN.

Temperature: 102° F

Therapy: MINOCIN Minocycline HCl Capsules, 100 mg: 200 mg *stat*, 100 mg every 12 hours. Medication began 9/7/71. By fourth day, temperature was normal and pustular lesions considerably improved. Last dose taken 9/14/71.

Concomitant therapy: None.†



Semisynthetic

MINOCIN®
MINOCYCLINE HCl

Capsules, 100 mg: 2 *stat*, 1 q 12 h.

Indications: For the treatment of susceptible infections; e.g., *E. coli*, *D. pneumoniae*. For full list of approved indications consult labeling.

Contraindications: Hypersensitivity to any tetracycline.

Warnings: The use of tetracyclines during tooth development (last half of pregnancy, infancy and childhood to the age of 8 years) may cause permanent discoloration of the teeth (yellow-gray-brown). This is more common during long-term use but has been observed following repeated short-term courses. Enamel hypoplasia has also been reported. Tetracyclines, therefore, should not be used in this age group unless other drugs are not likely to be effective or are contraindicated. In renal impairment, usual doses may lead to excessive accumulation and liver toxicity. Under such conditions, use lower total doses, and, in prolonged therapy, determine serum levels. Photosensitivity manifested by an exaggerated sunburn reaction has also been observed in some individuals taking tetracyclines. Advise patients apt to be exposed to direct sunlight or ultraviolet light that such reaction can occur, and discontinue treatment at first evidence of skin erythema. Studies to date indicate that photosensitivity does not occur with MINOCIN Minocycline HCl. In patients with significantly impaired renal function, the antianabolic action of tetracycline may cause an increase in BUN, leading to azotemia, hyperphosphatemia, and acidosis. CNS side effects (lightheadedness, dizziness, vertigo) have been reported, may disappear during therapy, and always disappear rapidly when drug is discontinued. Caution patients who experience these symptoms about driving vehicles or using hazardous machinery while taking this drug.

Pregnancy: In animal studies, tetracyclines cross the placenta, are found in fetal tissues, and can have toxic effects on the developing fetus (often related to retardation of skeletal development). Embryotoxicity has been noted in animals treated early in pregnancy. Safety of use during human pregnancy has not been established. **Newborns, infants and children:** All tetracyclines form a stable calcium complex in any bone-forming tissue. Prematures, given oral doses of 25 mg/kg. every 6 hours, demonstrated a decrease

in fibula growth rate, reversible when drug was discontinued. Tetracyclines are present in the milk of lactating women who are taking a drug of this class.

Precautions: Use may result in overgrowth of nonsusceptible organisms, including fungi. If superinfection occurs, institute appropriate therapy. In venereal diseases when coexistent syphilis is suspected, darkfield examination should be done before treatment is started and blood serology repeated monthly for at least four months. Because tetracyclines have been shown to depress plasma prothrombin activity, patients on anticoagulant therapy may require downward adjustment of such dosage. Test for organ system dysfunction (e.g., renal, hepatic and hemopoietic) in long-term use. Treat all Group A beta hemolytic streptococcal infections for at least 10 days. Avoid giving tetracycline in conjunction with penicillin.

Adverse Reaction: GI: (with both oral and parenteral use): anorexia, nausea, vomiting, diarrhea, glossitis, dysphagia, enterocolitis, inflammatory lesions (with monilial overgrowth) in anogenital region. **Skin:** maculopapular and erythematous rashes. Exfoliative dermatitis (uncommon). Photosensitivity is discussed above ("Warnings"). **Renal toxicity:** rise in BUN, dose-related (see "Warnings"). **Hypersensitivity reactions:** urticaria, angioneurotic edema, anaphylaxis, anaphylactoid purpura, pericarditis, exacerbation of systemic lupus erythematosus. In young infants, bulging fontanels have been reported following full therapeutic dosage, disappearing rapidly when drug was discontinued. **Blood:** hemolytic anemia, thrombocytopenia, neutropenia, eosinophilia. **CNS:** (see "Warnings.") When given in high doses, tetracyclines may produce brown-black microscopic discoloration of thyroid glands; no abnormalities of thyroid function studies are known to occur.

NOTE: Concomitant therapy: Antacids containing aluminum, calcium, or magnesium impair absorption; do not give to patients taking oral minocycline. Studies to date indicate that absorption of MINOCIN is not notably influenced by foods and dairy products.

*Indicated in infections due to susceptible organisms. Culture and sensitivity testing recommended. Tetracyclines are not the drugs of choice in the treatment of any staphylococcal infection. †Case Report, Clinical Investigation Department, Lederle Laboratories.



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Fracture Conference

A 19-Year-Old with Multiple Fractures

J. H. DOBYNS, M.D. AND G. E. SWANSON, M.D.

A 19-YEAR-OLD MALE WAS traveling in Europe prior to attending the University of Hamburg as an exchange student. As he was traveling with a professor and his wife through Finland, they stayed one night in rooms on the fifth floor of a hotel. After a dream, the patient awoke as he was crashing through a window to find himself falling five stories. Miraculously, there were no serious internal injuries and he was only unconscious for about 15 minutes. Figure 1-A is an Xray of his left hip, AP view, and no new information was added by the lateral. Figure 1-B is an

Doctors Dobyns and Swanson are in the Department of Orthopedics, Mayo Clinic, Rochester.



Fig. 1-B—The pelvic ring is disrupted at the left sacroiliac joint and wing of the ilium as well as at the right superior and inferior pubic rami.



Fig. 1-A—Comminuted subtrochanteric and intertrochanteric fracture, left hip.



Fig. 1-C—Minimally displaced fracture of the olecranon and radial head.

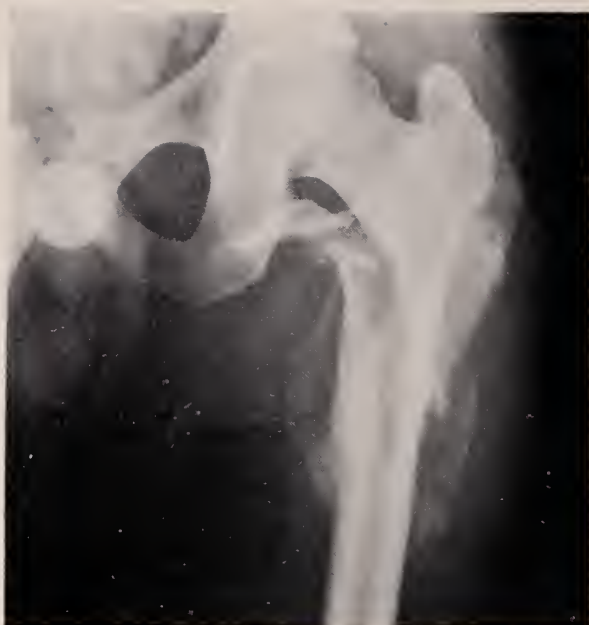


Fig. 2-A—Roentgenogram of left hip at six weeks post-injury. He has a full range of painless motion at the hip and $1\frac{3}{4}$ inch shortening.



Fig. 2-B—Six weeks postoperative roentgenogram, left elbow.



Fig. 3—Original AP and lateral roentgenograms of the right wrist. The distal carpal row including the distal pole of the scaphoid lies dorsal to the lunate and proximal scaphoid fragment.

Xray of the pelvis and Figure 1-C is of the left elbow. Dr. Cabanela, I wonder if you would tell us what you see on these Xrays and how you might manage the problem.

Dr. Cabanela:

I see a comminuted sub- and intertrochanteric fracture of the right femur. In addition, he has a right sacro-iliac disruption, pubic fractures of both the superior and inferior rami, and a fracture line through the wing of the ilium. We would prefer to treat his femoral fracture in traction. A modification of Russell's traction or even 90° - 90° traction (flexion of the hip and knee) would probably be adequate. Since he has pelvic injuries, skeletal traction with a tibial or distal femoral pin in a modified Russell's position would be better since his pelvic injuries should be treated with a pelvic sling.

There appears to be a fracture of the proximal ulna of his left elbow with each fragment containing 50% of the articular surface. There is a small fracture of the head of the radius, which is not displaced and should not require any further therapy. Once he is in good condition with his pelvic injuries, the fractured olecranon could be openly reduced and internally fixed with a tension wire as recommended by the AO group.

Dr. Swanson:

The pelvic and femoral fractures were treated with traction and a pelvic sling. The fracture of the olecranon was originally treated with a cancellous type of compression screw. Four days postoperatively the fracture fragments were separating and reduction was unsatisfactory. He was



returned to the operating room and a figure-eight tension wire was inserted. His femoral fracture at six and a half weeks after injury (Figure 2-A) demonstrates early union with massive callous present. We have done push-pull, abduction and adduction Xrays and cannot demonstrate any movement. He does have an inch and $\frac{3}{4}$ shortening of his femur on this side. Currently, he has a full range of painless motion of his hip and is on non-weight bearing crutch ambulation. Six and one half weeks after his injury the olecranon fracture is healing with a range of motion from 30° to 105° (Figure 2-B). At the time of his fall in

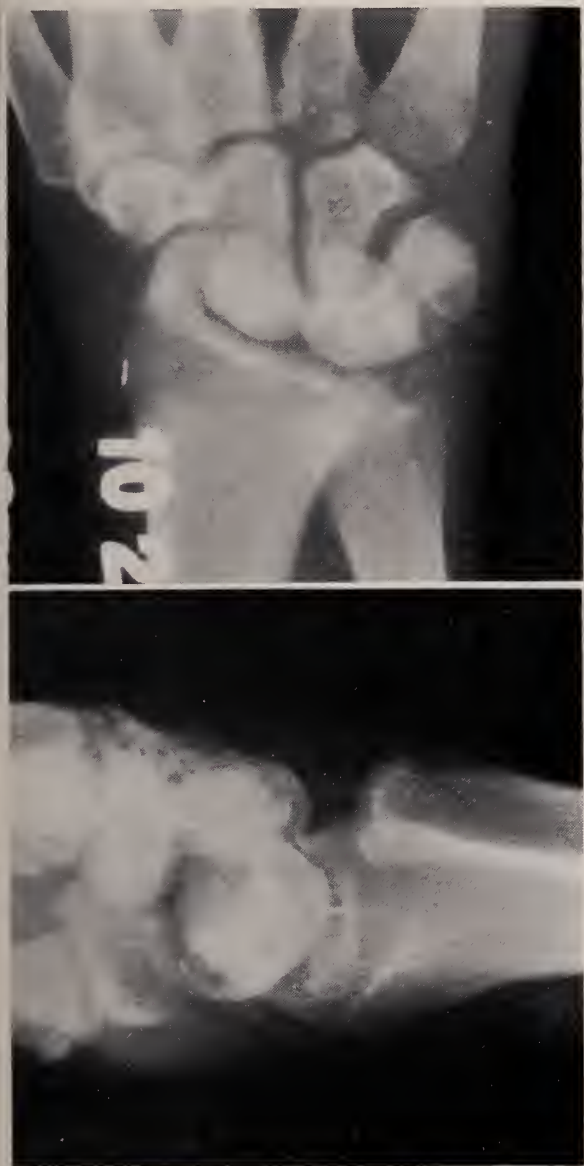


Fig. 4—Roentgenograms taken six weeks after open reduction and long-arm cast stabilization. The original deformity has recurred with increased ulnar translocation of the proximal carpal row.

Finland, he had this Xray of his right wrist, which demonstrates a trans-scaphoid, perilunate fracture-dislocation (Figure 3). The proximal pole of the scaphoid has stayed in relative alignment with the lunate and the lateral view reveals the capitate to be dorsal and out of its normal articulation with the lunate. The lunate is normally aligned with the distal articular surface of the radius. An open reduction through a dorsal incision was done in Finland shortly after his accident, and he was placed in a long-arm cast leaving his fingers free. On his return to the United States, the cast was removed and the Xray demonstrates the recurrence of the deformity (Figure 4).

Median nerve compression at the wrist is a frequent complication of this injury and on examination there was no sensation over the radial three digits of his hand. Thenar atrophy was present. The profile of his wrist at the time of surgery is seen in Figure 5. There is a volar prominence seen at the point of the hemostat which indicates the position of the volarly displaced lunate and scaphoid fragments. At the time of open reduction, the median nerve appears bruised and contused. As the flexor tendons and median nerve are pulled aside, the marked prominence of the proximal row of the carpus is visualized. There is a transverse tear through the volar radiocarpal ligament and volar subluxation of the proximal carpus (Figure 6). Following reduction of the lunate and proximal pole of the scaphoid, the tear in the volar capsule is noted to lie at the volar pole



Fig. 5—Volar prominence indicates the position of the displaced lunate-scaphoid fragment.

of the lunate. Dorsally, the pre-reduction configuration of the fragments is seen in Figure 7. Following reduction of the fragments, the scapholunate ligament is still intact in this instance because the line of force has been through the mid-carpus and then the scaphoid (Figure 8). After reduction and bone grafting of the scaphoid and some Kirschner wire stabilization, a dorsal, ligamentous reconstruction was done using one-half of the extensor carpi radialis longus tendon (Figure 9). It was



Fig. 6—Volar view of the carpus. The probe is in the tear of the volar carpal ligament. The displaced lunate is seen to bulge volarly, creating compression in the carpal tunnel. (A) displaced lunate; (B) distal capsule; (C) median nerve.

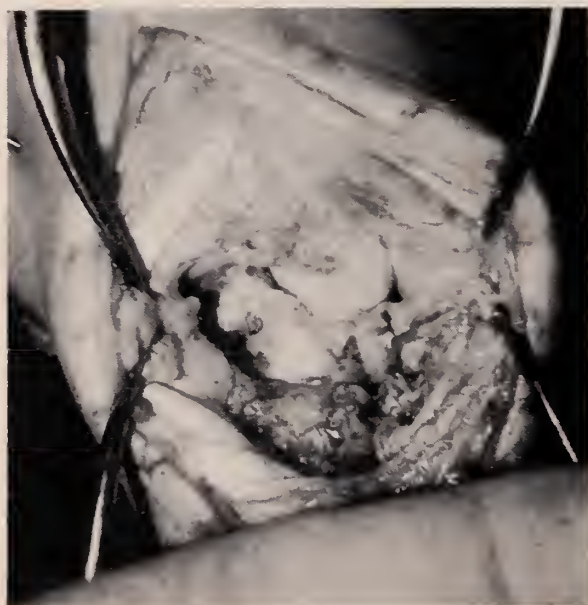


Fig. 8—Post-reduction dorsal view of the carpus. (A) The scapholunate ligament is intact; (B) Junction of the two scaphoid fragments.

attached to the dorsal aspect of the capitate, the scapholunate junction, and the distal portion of the radius. This will function as a reinforced capsular ligament so that with volar and dorsal flexion of the wrist, the possibilities of abnormal displacement will be reduced.

Post-reduction Xrays reveal the scaphoid fracture to be reduced and the radius, lunate, and capitate to be in normal alignment (Figure 10). There



Fig. 7—Dorsal view prior to reduction. (A) Volarly displaced lunate and proximal pole of the scaphoid; (B) Distal fragment of the scaphoid; (C) Capitate.



Fig. 9—Dorsal ligamentous reconstruction using one-half of the extensor carpi radialis longus tendon (A).



Fig. 10—Postoperative roentgenograms. Kirschner wires stabilize the scaphoid fracture as well as the perilunate dislocation.



Fig. 11—Wrist one year after open repair of trans-scaphoid perilunate dislocation.

is a fragment of bone seen dorsally on the lateral view that was from the triquetrum and is representative of the dorsal capsular stripping which was found. It was excised following this Xray.

This patient is only ten days postoperative, and we don't have any long-term follow-up to illustrate the expected course after the injury and surgery. Xrays from a patient who sustained an identical injury several years ago are presented. He also had complete median nerve paralysis distal to the wrist and was reduced through volar and dorsal approaches with similar reconstruction. Subsequent Xrays at six months show that his lunate did undergo partial avascular necrosis as well as the proximal pole of his scaphoid. At one year there is still a little bit of avascular necrosis of the proximal pole of the scaphoid but both bones are revascularizing (Figure 11). He had complete return of his median nerve with strong oppositional pinch and normal sensation. At this time, he had two-thirds of normal grip strength power and 60 to 70% of normal range of motion of his wrist.

Dr. O'Hara:

These dislocations are thought to be rather uncommon and MacAusland¹ states that in 24 years of orthopedic practice, he had seen only 27 cases. There are two types, depending upon whether the lunate retains its alignment with the distal radius or not. Type I is the perilunate dislocation in which the carpus dislocates dorsal to the lunate, with the lunate retaining its normal line with the distal radius. Type II is a pure lunate dislocation in which the lunate is squeezed volarly and lies perhaps in the carpal tunnel. Multiple fractures or dislocations of the scaphoid, capitate, triquetrum, radius or ulna can be associated with the basic perilunate dislocation and give a wide variety of x-ray appearances. Most authors feel that if these are seen within two weeks, closed reduction can be obtained with eventual good results. MacAusland recommends these be maintained in plaster for a period of four weeks with the wrist in 30 to 40° of flexion. If there is a trans-scaphoid fracture associated with the dislocation, Verdan² states that the plaster should be extended above the elbow because he was able to demonstrate motion at the scaphoid fracture site with pronation and supination of the forearm.

The indications for open treatment are not as clear. MacAusland gives four well-defined indications: (1) if closed reduction has not

been successful; (2) if there is severe injury to the carpal bones, usually capitate or scaphoid; (3) if the median nerve is compressed; and (4) if the injury is over two weeks old. Campbell et al.³ favor early open reduction if there is a trans-scaphoid or trans-capitate type of injury with multiple fragments of the capitate. They favor early open reduction and either removal or Kirschner wire fixation of the capitate fragment and early open reduction when there is a periscaphoid, perilunate dislocation with rotatory displacement of the scaphoid rather than a fracture.

When the dislocation is three to four weeks old, most authors feel that open reduction can still give us a good result if the articular surfaces are not severely damaged. Beyond five weeks, it is felt that severe soft tissue fibrosis and damage to the articular surfaces precludes a satisfactory result, even if anatomical reduction is obtained. Most people favor either partial or total arthrodesis of the wrist or excision of the proximal carpal row.

Dr. Dobyns:

We don't think such injuries are very rare, although the extreme examples that we see today are uncommon. Injuries to the wrist that result in some degree of instability are common. We feel that injuries obtained from dorsiflexion stresses are similar. How often do closed manipulative treatments take care of them adequately? I don't think anybody knows that for sure. We know the problems; we know when major subluxations recur; but the problems of minor instabilities that lead to later severe changes in the wrist are poorly discussed in the literature. Though there is an increasing concern with the need for open reduction, what should be done and how it should be done are vaguely described. The gross pathology as seen at surgery should assist in clarifying the requirements.

Dr. Paul Brand:

I haven't seen many of these cases in the acute stage in recent years, but we used to be concerned about the tendency of the capitate and lunate to make kind of a Z-shaped buckling. It is quite difficult to hold these bones in position while you are working with them. One may put the wrist in an odd position, like hyperflexion, to get the lunate in position, and then put the first Kirschner wire through the radius and nail the lunate; then reposition the wrist to a more neutral position and

pass the wire further into the capitate. In the postoperative phase this technique permits a more natural and neutral position. If you try to get your complete reduction initially without wires, you may find the wrist in a position which will interfere with rehabilitation when immobility is discontinued. By placing the wires in sequence one can often finish with good anatomical and physiological position of the wrist. This will help in the postoperative mobilization, prevent the pain at that stage, and obviate the need for later arthrodesis.

Dr. Dobyns:

Thank you, Doctor Brand. The technique you have described is a very useful one. I feel that we may have arrived at a mid-stage rather similar to ten years ago when more and more interest was devoted to the patterns of ligament rupture around the knee and the ankle. At that time we knew we had problems with those joints, but it wasn't too clear how many things could be injured, or how you needed to repair and replace them when they were injured. The wrist has been overlooked for many years and injuries are termed wrist sprain with little regard to the degree or site of the damage. The patterns of damage here probably are always multiple involving ligaments, bones, and joint surfaces. We have for many years known that the scapholunate ligament was disrupted in many of these injuries and some of us have tried to repair or replace that ligament. Discussion of the volar rent, what it meant, and what one should do about it has been almost minimal. Even those who said that one might preferably enter the wrist from the volar direction gave other reasons such as a need to relieve the pressure on the median nerve or to fish the lunate out of the tunnel. But there has been little said about this very big and very obvious deficiency in the structural integrity of the wrist. We are now at the point where we have information about the specific problems in each of these injuries and can specifically repair most of them. I am at the point where I look for reasons to open these major injuries (or even the minor ones for that matter), if the pattern of stability in the wrist is obviously not normal. The minor problems one sees are the scaphoid and lunate bones gradually spreading apart or the proximal row sinking down under the capitate; or, rarely, rising over the capitate. To repair many of these problems, particularly in the

19-YEAR-OLD WITH MULTIPLE FRACTURES

more severe injuries, an approach from both the volar and the dorsal aspects probably should be done at the same time. The reduction is much easier and it allows you to assess and repair liga-

mentous as well as bony structures about both surfaces of the wrist. Both tissues are important to eventual stability and good function.

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"Problems in Adolescent Gynecology"

(AAFP Accredited)

Presented by Methodist Hospital

February 28, 1973

One Day Workshop Program

- 8:00 NORMAL AND ABNORMAL FEMALE SEXUAL MATURATION
Henry Sauls, M.D. University of Minnesota
- 8:45 AMENORRHEA—PRIMARY AND SECONDARY
Martin Weisberg, M.D. Minneapolis
- 9:30 VULVO-VAGINITIS IN CHILDREN
Vincent Capraro, M.D. Buffalo, New York
- 10:15 **coffee**
- 10:30 EVALUATION AND TREATMENT OF ABNORMAL BLEEDING
Leon Adcock, M.D. University of Minnesota
- 11:15 DYSMENORRHEA AND PELVIC PAIN
Elizabeth Mussey, M.D. Mayo Clinic
- 12:00 **lunch**
- 1:30 THE MOLESTED FEMALE—EVALUATION AND TREATMENT
Vincent Capraro, M.D. (visiting professor), Clinical Professor of OB/GYN,
New York State University, Buffalo, New York
- 2:15 ADOLESCENT PREGNANCY
Fred Mecklenburg, M.D. Minneapolis
- 3:00 **coffee**
- 3:15 CONTRACEPTION IN THE ADOLESCENT—PRO AND CON
Fred Lyon, M.D. Minneapolis
- 4:00 COMMUNITY RESOURCES FOR THE SEXUALLY ACTIVE TEENAGER
Marjorie Carpenter, Director Community Information and Referral Service
- 6:00 social hour at the Radisson South
- 7:00 dinner at the Radisson South
- 8:00 "GYNECOLOGICAL LUMPS AND BUMPS IN CHILDREN"—what not to do

This meeting will be held in the Methodist Hospital Auditorium, and there will be *no charge for attendance*. The meeting is open to all members of our medical community, whether or not they are affiliated with Methodist Hospital. There will be a charge for non-members of the Methodist Hospital Medical Staff who choose to attend the dinner program at Radisson South. AAFP will give eight hours of credit for attendance at this meeting.

The co-chairmen of this meeting are Dr. Edward Maeder, Jr. and Dr. Roy House, both of whom are associated with the St. Louis Park Medical Clinic. Their telephone number is 927-3123.

This world, where much is to be done and little to be known.—Samuel Johnson



Book Reviews

CALL THE DOCTOR: QUESTIONS PARENTS ASK ABOUT THEIR CHILDREN by Robert F. L. Polley, M.D. 164 pages. \$3.00. Parents Handbooks, 1971.

Baby and Child Care by Doctor Spock, the classic baby care book, and an excellent book in a light vein, *How to Raise Children at Home in Your Spare Time* by Doctor Marvin Gersh are now joined by another contribution for parents. However, this latter supposed aid does not measure up to the others in aid for the perplexed parent.

Areas well covered include skin care and bathing, thumb sucking, teething, infant food needs, and adoption. However, sections discussing breast feeding supplements, solid food and whole milk diet addition, self feeding, bottle propping, vitamin use, and an archaic view of tongue tie treatment are often contradictory to feelings of most teachers and experienced practitioners. A recurrent preoccupation with aid for stool elimination and explanation sections on colic are poor. Five pages on crib deaths will force most parents to sit at cribside every nap and sleep time. An area pertaining to teenage acne is out of place as are sections on drugs in our society, alcohol, and school problems which are not in the proper sphere of this book, although well done.

I found myself not knowing if the book was meant for the physician or for the parent. The continuity and subjects handled were far too broad—childhood and teenage cannot be covered in 164 pages! Sustained enjoyable reading or helpful answers are not part of this book. The two books noted earlier are musts—*Call the Doctor* is a must—not for the parent.

Lawrence J. Singher, M.D.
Minneapolis, Minnesota

REVIEW OF MEDICAL MICROBIOLOGY by Ernest Jawetz, Joseph L. Melnick, and Edward A. Adelberg. 10th Edition. Lange Medical Publications, Los Altos, California, 1972. 518 pp.

This book, as the title indicates, is a review of the topic of medical microbiology. The authors have oriented the presentation of the material to the physician, with emphasis on clinical infections and chemotherapy, with a significant portion of the volume also devoted to a discussion of the diagnosis of various infectious processes and to the principles of basic science. Dr. Jawetz, the senior author of this work, now in its tenth edition, is a figure of considerable stature in the fields of microbiology and clinical infectious diseases. The book demonstrates his combined training and experience.

The chapters are oriented to a review of basic princi-

ples through the first 160 pages, and the remaining pages are devoted to reviews of each of the numerous morphologically related organism categories. While the volume is meant to be a review, it is comprehensive in its scope, and fulfills the authors' objectives in an admirable manner. The narrative is readable with key words standing out in bold type. In attempting to be economical, however, the publishers have resorted to small print which taxes the reader settling down with the volume for any extended period of time. There is a free use of tables and diagrams and some actual photographs of material best illustrated in that manner. Reference listings are brief, and in general geared more for general reading in line with the "review" concept of the volume.

On the whole, the volume accomplishes its purpose, and, whereas at times one is not satisfied with the amount of information present, one must admit to truly receiving a rather comprehensive review of the field of medical microbiology through perusing its pages.

John M. Matsen, M.D.
Minneapolis, Minnesota

CONFESSIONS OF A GYNECOLOGIST, Anonymous, M.D. Doubleday and Company, Inc., Garden City, New York, 1972, 319 pages, \$7.95.

Behind the shield of anonymity, this author who, according to the publisher is a well known gynecologist, reminisces about his 30 years of practice. This allows him considerable leeway to comment on the foibles of patients as well as colleagues.

from natural childbirth to abortion and birth control. The style of the author is anecdotal. Narrative material is interspersed with factual information about current gynecological practice. In making interpretations beyond the cological practice. In making interpretations beyond the factual material, the doctor takes leeway. He does, however, admit that there is room for challenge of his opinions.

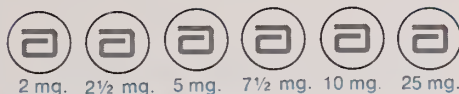
The author is especially effective in pointing out the gynecology patient who goes from doctor to doctor with vague complaints. He is less clear in effective management of such a patient.

In style and content, this book is directed to the general reader. The value to the doctor is in keeping up with what his patients may be reading. Women, who are the subject of this book, will be intrigued at what their gynecologist is thinking, but will also be piqued.

Dorothy M. Bernstein, M.D.
Minneapolis, Minnesota

A name
worth repeating

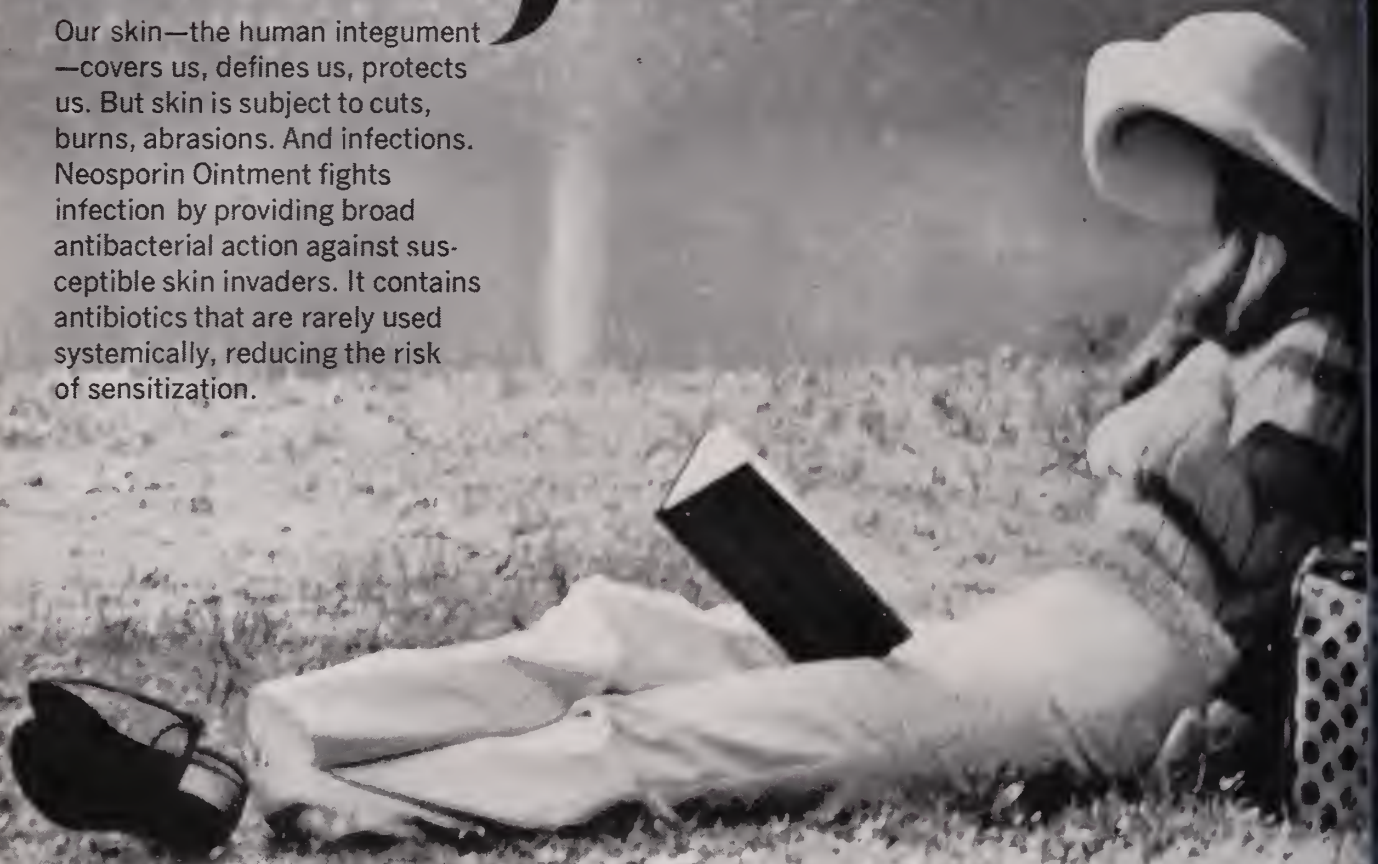
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Prophylactically, the ointment may be used to prevent bacterial contamination in burns, skin grafts, incisions, and other clean lesions. For abrasions, minor cuts and wounds accidentally incurred, its use may prevent the development of infection and permit wound healing.

CONTRAINDICATIONS: Not for use in the external ear canal if the eardrum is perforated. This product is contraindicated in those individuals who have shown hypersensitivity to any of the components.

PRECAUTION: As with other antibiotic preparations, prolonged use may result in overgrowth of nonsusceptible organisms and/or fungi. Appropriate measures should be taken if this occurs. Articles in the current medical literature indicate an increase in the prevalence of persons allergic to neomycin. The possibility of such a reaction should be borne in mind.

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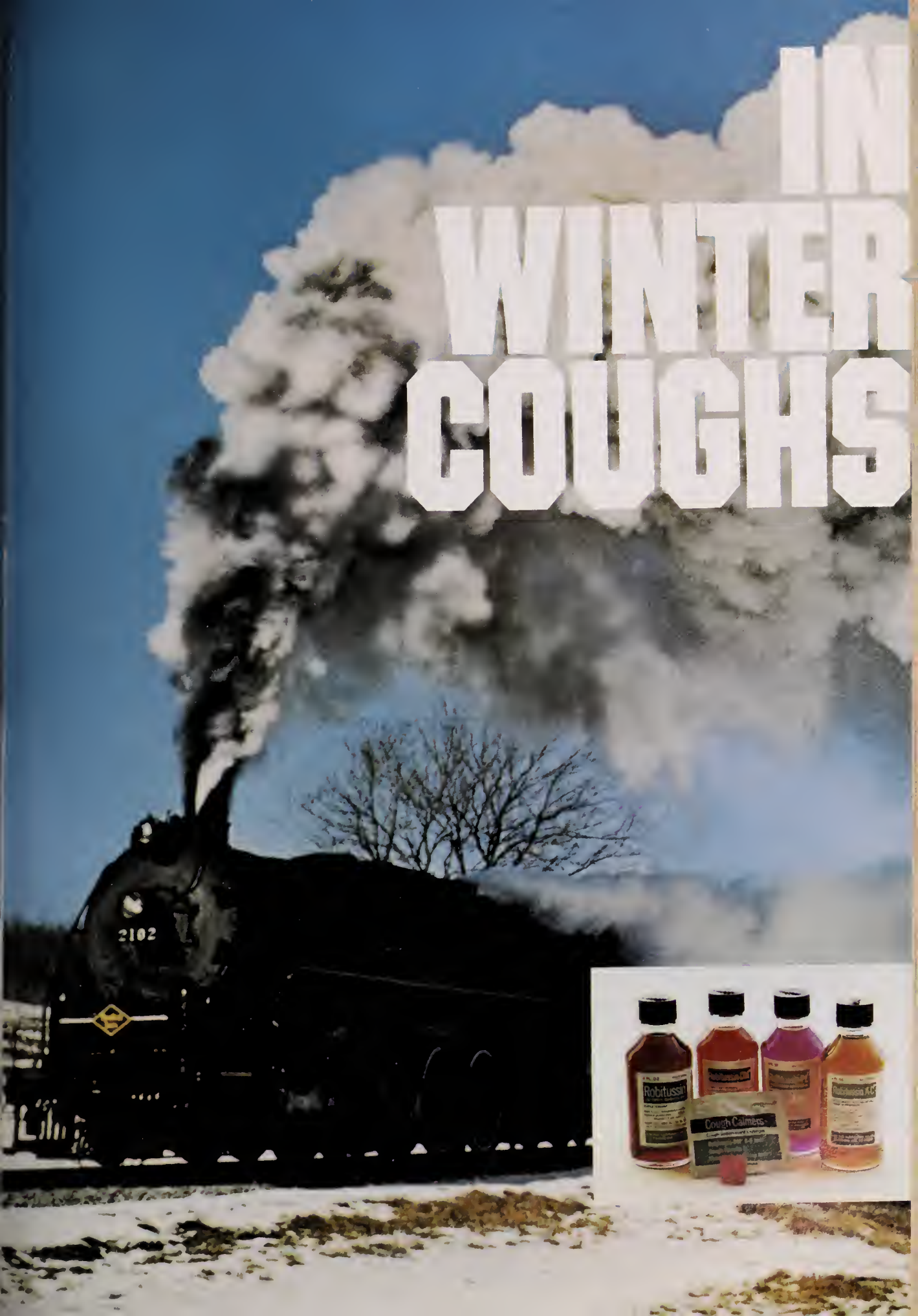
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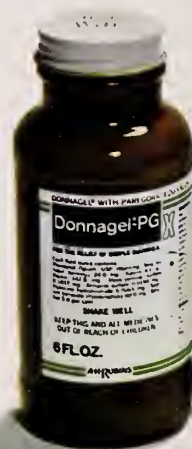
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Integrated Psychiatry and Its Practical Application

In A 273 Bed General Hospital

IRVING C. BERNSTEIN, M.D. M.S.

THE PRIVATE HOSPITAL care of psychiatric patients in Minneapolis has been constantly changing and progressing during the past two decades. In 1951 only one private hospital providing complete psychiatric care existed in Minneapolis, which was the 60-bed suburban Glenwood Hills Psychiatric Hospital, a hospital isolated from the general practice of medicine. It has since become a general hospital, with a separate building for psychiatric patients. The establishment of psychiatry in general hospitals began with the opening of the Fairview Hospital Psychiatric Unit in 1955. Shortly afterward, St. Mary's Hospital opened a psychiatric ward, and then a number of units were opened at Abbott, St. Barnabas, Northwestern, and North Memorial hospitals, each with individual orientation, but all centered in a wing or section of the respective general hospital.

The acceptance of these units was a gratifying experience, and psychiatrists began to be accepted as "real doctors." The staff of the obstetrical and gynecological service at the University of Minnesota Hospital was managing the majority of the psychiatric illnesses occurring in their patients effectively and efficiently on the ward, and the acceptance of psychiatry and psychiatrists was the greatest there. The psychiatrist involved in this endeavor had a joint teaching appointment in psychiatry and obstetrics and gynecology, an early example of integrated psychiatry.¹

In 1969 Mt. Sinai Hospital decided to have a psychiatric service, an integrated unit. It would not only be less expensive to open (Mt. Sinai already had four security rooms) but it might be better for all the patients, and provide an opportunity to stimulate, support, and educate all hospital personnel in dealing with the emotional aspects of illness. The service was to be based on

the philosophy that the needs of most psychiatric patients can best be treated on general medical wards which would produce mutual benefit to psychiatric and medical-surgical patients.

Mt. Sinai already had a Methadone program functioning under the direction of an internist; however, Model City administrators who provided the funds for this program stipulated that they would continue to support it only if it was under the direction of a psychiatrist and had a functioning rehabilitation section. Thus, the opportunity presented to establish the essentials of a mental hygiene clinic with in-patient psychiatric care, out-patient psychiatric care, emergency care, partial hospitalization, and education and consultation. Furthermore, it gave the Chief of Psychiatry at Mt. Sinai Hospital the immediate opportunity to work with both the administration of the hospital and a consumer organization.

To study the problem in detail, Greenwich Hospital in Connecticut was visited. This hospital has had an integrated psychiatric service since the late 1940's, its development had been reported by Dale and Wright in 1962.^{2,3} Awareness of this unit gave the initial workers more impetus and enthusiasm to set up a similar unit at Mt. Sinai. An executive committee of three psychiatrists was appointed to establish tentative policies for the unit. Some of the by-laws at Mt. Sinai Hospital had to be changed to accommodate psychiatry, including one stating that "the hospital is not able to assume the responsibility for the care and supervision of disturbed or dangerous patients on an open station."

It was agreed that any attending physician could transfer or admit a patient to a security room without first having the approval of a psychiatrist. The goal always in mind was to develop psychiatric expertise in all physicians. The Chief of Psychiatry became a member of the Executive Committee within the first year of operation.

¹Presented at Midwinter Meeting of the Colorado Psychiatric Society, Vail, Colorado January 1972.

Dr. Bernstein is a Clinical Professor, Psychiatry, Obstetrics & Gynecology, University of Minnesota Medical School; Chief of Psychiatry, Mt. Sinai Hospital, Minneapolis, Minnesota.

The first psychiatric patient on the new program was admitted to Mt. Sinai hospital on May 15, 1971, only 45 days after the target date set one year earlier. On that day, in Minneapolis, psychiatry returned to the confines of general medicine, where it belongs, after being isolated for years in its "Ivory Tower" or in a State Hospital, or in Glenwood Hills Hospital. Education has been considered as a primary goal of the integrated service from its inception and has included the medical students and house staff. Students on their Mt. Sinai medical experience are given a weekly seminar. Some students chose an elective with a staff psychiatrist either full or halftime for three or six weeks. Some of the Minneapolis nursing schools, including the University of Minnesota, are now sending their students to Mt. Sinai hospital for psychiatric experience.

The only criteria for admission to the psychiatric service is that the patient's behavior be such that the patient can be treated at Mt. Sinai. The usual categories of psychiatric patients have been treated (Table 1, 2, 3). Patients are admitted to any empty bed in the hospital. Electroshock therapy (E.S.T.) is administered in the patient's room, including double rooms and four bed rooms, after the curtain is drawn. The effectiveness of E.S.T. in correctly chosen patients and the smoothness of its administration have been a surprise to many

of the doctors and other staff members at Mt. Sinai. Of 120 psychiatric admissions in the first seven months, 24 received E.S.T. (Table 4). In the first seven months of operation, only three patients have been transferred to another hospital in the city and no patient has been committed to a State Hospital. One transfer occurred soon after the unit opened and probably would not be transferred today since psychiatric patients are now more accepted by the Mt. Sinai Medical Staff.

It is obvious that hospitals can function without a psychiatric service, but can they function better with such a service? After seven months' experience, the staff and administration at Mt. Sinai would agree that psychiatry has assisted the hospital to function better and that all their patients are receiving better care and even that lives are being saved. One example was a 95-year-old patient with anorexia nervosa who was about to die and whose life was saved by E.S.T.⁴ The staff has been particularly impressed with psychiatry's effectiveness in managing masked, as well as obvious, depressions, manic-depressive episodes, and behavior problems. All staff members are constantly being advised and shown that treating all patients with dignity and using simple techniques such as calling adult patients by Mr., Mrs., or Miss, will contribute to improved behavior by giving these patients a "corrective emotional ex-

TABLE 1
Treatment of Psychoneurotic Reactions

Type	Male	Female	Age In decades	Days In Hospital	EST	Disposition
Anxiety Neurosis	3	1	3rd—1 5th—1 7th—1 8th—1	6-13 (average 9.5)	0	Home
Hysterical Neurosis		1	5th—1	3	0	Home
Hysterical Neurosis (conversion type)	1	4	4th—1 5th—4	2-7 (average 4.6)	0	Home
Depressive Neurosis	5	27	2nd—1 3rd—5 4th—3 5th—5 6th—7 8th—5 9th—1	5-39 (average 14.6)	13 rec'd 3-6 EST 1 rec'd 10 EST	All home except 1 to another hospital & 1 to Nurs'g Home
Hypochondriacal Neurosis		10	2nd—1 4th—4 5th—1 6th—3 8th—1	5-20 (average 10.2)	2 rec'd 4-6 EST	Home
TOTALS	9	43			15 Rec'd EST	

INTEGRATED PSYCHIATRY

perience."⁵ Some resistance was encountered and handled when these and similar changes were first advocated.

The positive feelings being shown toward psychiatry by the medical staff now were not so evident in our planning and early days. At that

time most of the staff felt psychiatric patients should be segregated, feelings based on the staff's fears without an understanding of the psychiatric problems involved. To combat these feelings the referring physician is encouraged to participate in the examination and treatment of the psychiatric

TABLE 2
Treatment of Psychotic Reactions

Type	Male	Female	Age in Decades	Days In Hospital	EST	Disposition
Psychosis with Nutritional Disorder		1	3rd—1	4	0	Home
Acute & Chronic Brain Syndrome	1	5	7th—1 8th—3 9th—2	4-16 (average 9.2)		All home, except 1 to Rest Home
Schizophrenia Paranoid type	6	6	3rd—2 4th—2 5th—4 6th—1 7th—2 10th—1	5.30 (average 14.9)	5 rec'd 5-7 EST,	1 returned to State Hosp., 2 to other Hosp., 3 to rest home, 4 home.
Schizoaffective type		1	6th—1	35	7	Home
Ch Undifferentiated		1	5th—1	6		Home
Major Affective Disorders						
Manic Depressive Illness		2	6th—2	10-11 (average 10.5)	2-4	Home
Psychotic Depressive Reaction	1	1	4th—1 5th—1	11-14	3 EST	Home
TOTALS	8	17			9 Rec'd EST	

TABLE 3
Treatment of Personality Disorders

Type	Male	Female	Age In Decades	Days In Hospital	Disposition
Paranoid Personality	1	1	5th—1 6th—1	2-6 (average 4)	Home
Schizoid Personality		6	2nd—1 3rd—2 4th—1 7th—2	3-23 (average 10.5)	Home
Anti-Social Personality		2	2nd—1 3rd—1	1-12 (average 6)	Home
Passive Aggressive Personality (Including Transvestism in one patient)	4	26	2nd—3 3rd—11 4th—5 5th—2 6th—3 7th—4 8th—1 9th—1	1-29 (average 10.4)	Home— except 1 died
Inadequate Personality		1	3rd—1	20 days	Home
Alcoholism		1	7th—1	10 days	Home
Transient Situational Disturbance		1	4th—1	15 days	Home
TOTALS	5	38			

cases they admit to the hospital. They can then observe how a psychiatrist functions and that he functions not unlike the usual physician, making a diagnosis, instituting treatment and making a disposition. The psychiatrist choosing to practice in an integrated general hospital will have to practice this way. He must be a medical doctor in the strictest sense of the word. In many instances, the patient is not transferred to the psychiatrist's service, and the psychiatrist acts only as an adviser. This is in keeping with the philosophy of the service, which is to foster psychiatric understanding by all physicians and to encourage the family physician or surgeon to assume responsibility for most of the emotional care of his patients, using the psychiatrist only when specifically needed. This gives all patients better care and especially psychiatric patients, who are then not isolated from familiar surroundings and their own physicians. If the case is primarily a psychiatric problem, the patient is transferred to the psychiatrist's service, with the referring doctor being the adviser. This procedure has worked smoothly. Patients with emotional problems are not staying in the hospital as long as they did in the past, the average length of stay for psychiatric patients being only 11.4 days (Table 4).

TABLE 4
Summary First Seven Months
Mount Sinai Psychiatric Service

	Total First 7 Months			Received EST
	Male	Female	Total	
Psychoses	8	17	25	9
Neuroses	9	43	52	15
Personality Disorders	5	38	43	0
	22	98	120	24

Total Psychiatric Days = 1,378

Average Length of Stay = 11.4

In general, the integrated psychiatric service at Mt. Sinai has gone smoothly, though there have been problems—some medical, some administrative—but these were expected and are handled as they occur. Examples of such problems are:

1. One doctor's patient with a "coronary" was disturbed by a noisy psychiatric patient in the next room. Since the doctor refused to move

his patient, the psychiatric patient was transferred to a psychiatric ward of another hospital. This type of situation would probably not occur today because the psychiatric patient is more acceptable at Mt. Sinai by the staff.

2. Early, some of the doctors felt that their "normal" patients should not be in rooms with "psychiatric" patients, but when some of these "normal" patients developed psychiatric symptoms the doctors ceased complaining.
3. An otologist complained of a noisy child being on the pediatric ward. He wondered whether such a "psychiatric" patient should be treated with the usual pediatric patient. This "noisy" child had a subarachnoid hemorrhage and it was demonstrated to him that a quiet child might be more emotionally ill than a noisy child.
4. Some members of the Hospital Board were concerned about the "image" of the hospital having an integrated psychiatric unit. They were pleased when the newspaper reports were uniformly favorable.

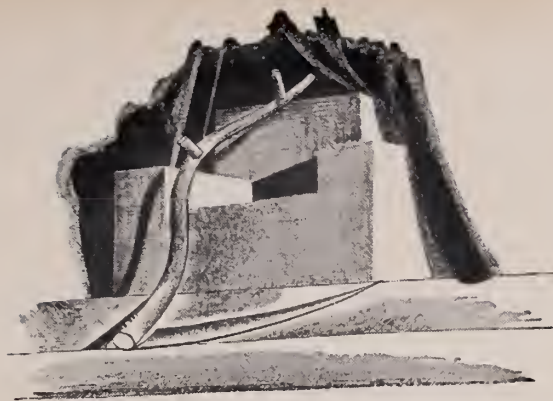
How the Medical Staff's negative feelings about psychiatry have been handled have already been stated. To combat the negative feelings of others, educational lectures by the psychiatric staff are being given and are beginning to counteract these feelings.

In summary, the psychiatric service at Mt. Sinai hospital is now seven months old, and it appears that it is here to stay. Patients are receiving excellent care, the medical staff and administrative staff are pleased and cooperating, the psychiatry service is flourishing, two part-time psychologists are busy, the occupational therapy department is growing, social service is effective, and supportive group therapy started recently. More integration, especially in pediatrics, better out-patient follow-up, and the obtaining of improved interviewing rooms have top priority for the immediate future.

This kind of psychiatric facility can be recommended, because it will provide excellent care for psychiatric patients; it will improve medical care throughout the hospital, and it will advance psychiatric teaching, providing there is a dedicated psychiatric staff, a cooperative hospital administration, a receptive medical staff, and a willing nursing service.

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3. Wright HS and Dale PW: A psychiatric service as an integral part of a community general hospital. *Psychiat in Med* 1:81, 1970.
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5. Selzer L: The use of first names in psychotherapy. *Arch Gen Psychiat* 3:215, 1960.



In Memoriam

The buried are not lost, but gone before.—Ebenezer Elliott.

DUNCAN M. MASSON, M.D.

Dr. D. Morrison Masson, 80, emeritus member of the Mayo Clinic staff, died December 14, after a long illness. He was a specialist in internal medicine at the Mayo Clinic from 1922 until he retired in 1957.

Dr. Masson was born in Owen Sound, Ontario, Canada and received his medical education at the University of Toronto. In 1921 he came to Rochester to begin a fellowship in surgery and the following year was appointed first assistant in medicine. In 1925 he was appointed to the staff and in 1936 became an assistant professor in the Mayo Graduate School.

He was a member of the American Medical Association and the Zumbro Valley Medical Society and an Associate and 50 Club Member of the Minnesota State Medical Association.

Dr. Masson is survived by his wife, Laura May, a son, D. Morrison Masson, Jr. and two daughters, May and Jean.

DAVID J. HALPERN, M.D.

Dr. David Halpern, 65, Brewster physician, died September 26, following a heart attack. He came to Brewster in 1932 and served on the staff of the Worthington Regional Hospital for the past 40 years.

Dr. Halpern was a member of the Southwestern Minnesota Medical Society, the American Medical Association and the Minnesota State Medical Association. His medical degree was obtained at the University of Minnesota Medical School.

He is survived by his wife, Maude.

W. R. KOONS, M.D.

Dr. W. Koons, 51, Mahanomen physician, was killed October 7, when the automobile he was driving went out of control, left the road and overturned into a shallow pond.

Born in Washington, D.C., Dr. Koons graduated from Northwestern Medical School in Chicago in 1951. He practiced in Lidgerwood, North Dakota, from 1952-1957 and later came to Mahanomen to practice.

He was a member of the Minnesota State Medical Association, the Clay-Becker County Medical Society, the American Medical Association and the Academy of General Practitioners.

Dr. Koons is survived by his wife, Herdes, and four daughters, Andrea, Valerie, Kimberly and Stacy.

ARTHUR M. MULLIGAN, M.D.

Dr. Arthur M. Mulligan, 69, Brainerd physician, died October 23. He had resided in Brainerd since 1936 and was a member of the Upper Mississippi Medical Society, the American Medical Association and the Minnesota State Medical Association.

Dr. Mulligan was born in Beatrice, Nebraska, and attended the University of Nebraska College of Medicine.

He is survived by his wife, Mildred, two sons, Mike and Pat, and two daughters, Zita and Patricia.

ROBERT J. NORDBERG, M.D.

Dr. Robert Nordberg, 29, Little Falls physician, died November 6. He had suffered a severe electrical shock at his home in July.

Dr. Nordberg was born in Little Falls and had graduated from the University of Minnesota Medical School in 1967.

He is survived by his wife, Janice and three daughters, Cynthia, Julie and Brenda.

FREDRICK A. WILLIUS, M.D.

Dr. Fredrick A. Willius, Mayo Clinic emeritus cardiologist, died October 19 at the age of 83. Born in St. Paul, Dr. Willius received his medical degree from the University of Minnesota Medical School in 1914. He became a fellow in surgery in 1915, joined the Clinic staff as a consultant in medicine in 1920 and became a senior consultant in 1945.

Dr. Willius was certified as a specialist in internal medicine by the American Board of Internal Medicine, was a fellow in the American College of Physicians, former president of the Minnesota Society for the Study of Diseases of the Heart and Circulation, authored many books, was a member of the Zumbro Valley Medical Society and the American Medical Association and an Associate and 50 Club Member of the Minnesota State Medical Association.

He is survived by his wife, Stella, and three daughters, Mary Elizabeth, Jane Eleanor and Dorothy.

ERLING W. HANSEN, M.D.

Dr. Erling W. Hansen, 82, Minneapolis otolaryngologist, died December 17. He received his medical degree from the University of Minnesota Medical School in 1915, and was a member of the American Medical Association and the Hennepin County Medical Society. He was also a Life Member and 50 Club Member of the Minnesota State Medical Association.

Dr. Hansen is survived by his wife, Anna Ruth, son, Gordon, and daughter, Mary.

ALBERT T. HAYS, M.D.

Dr. Albert T. Hays, 65, Minneapolis surgeon, died November 6. He was born in St. Paul, and attended the University of Minnesota Medical School.

Dr. Hays was a member of the Hennepin County Medical Society, the American Medical Association and the Minnesota State Medical Association.

He is survived by his wife, Genevieve, son, Thomas, and two daughters, Ann and Mary.



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Until response is determined, patients receiving Valium should be cautioned against engaging in hazardous occupations requiring complete mental alertness, such as driving or operating machinery.



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Contraindicated: Known hypersensitivity to the drug. Children under 6 months of age. Acute narrow angle glaucoma; may be used in patients with open angle glaucoma who are receiving appropriate therapy.

Warnings: Not of value in psychotic patients. Caution against hazardous occupations requiring complete mental alertness. When used adjunctively in convulsive disorders, possibility of increase in frequency and/or severity of grand mal seizures may require increased dosage of standard anticonvulsant medication; abrupt withdrawal may be associated with temporary increase in frequency and/or severity of seizures. Advise against simultaneous ingestion of alcohol and other CNS depressants. Withdrawal symptoms (similar to those with barbiturates and alcohol) have occurred following abrupt discontinuance (convulsions, tremor, abdominal and muscle cramps, vomiting and sweating). Keep addiction-prone individuals under careful surveillance because of their predisposition to habituation and dependence. In pregnancy, lactation or women of childbearing age, weigh potential benefit against possible hazard.

Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.


Dosage: Individualize for maximum beneficial effect.

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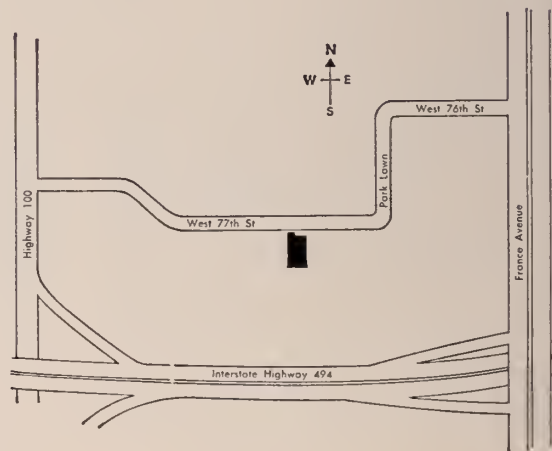
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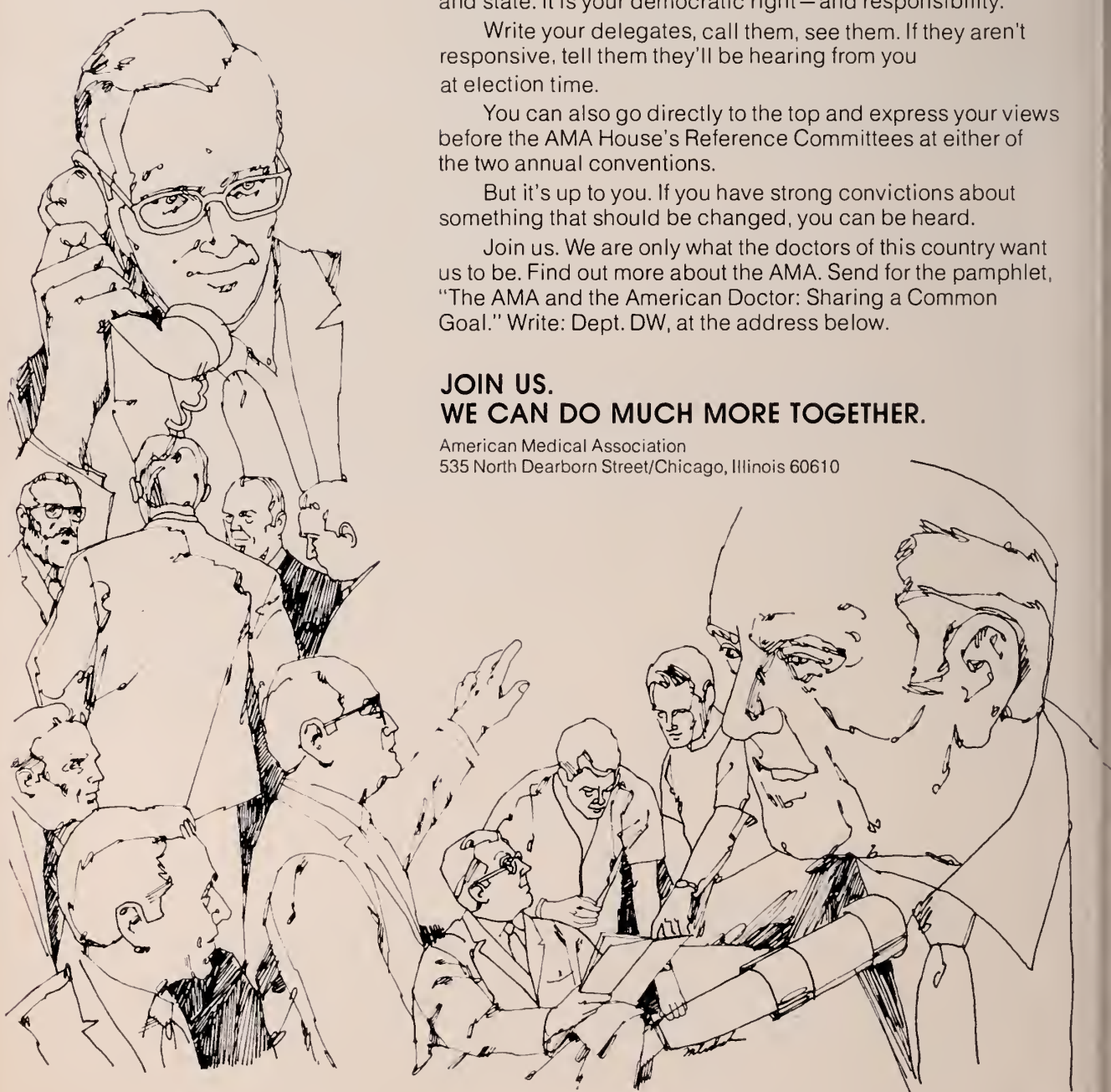
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Warnings: Age, weight, dosage, duration of therapy, existence of concomitant diseases, and concurrent potent chemotherapy affect incidence of toxic reactions. Carefully instruct and observe the individual patient, especially the aging (forty years and over) who have increased susceptibility to the toxicity of the drug. Use lowest effective dosage. Weigh initially unpredictable benefits against po-

tential risk of severe, even fatal, reactions. The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias, including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonamides, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

Precautions: The following should be accomplished at regular intervals: Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activity requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

Adverse Reactions: This is a potent drug; its misuse can lead to serious results. Review detailed information before beginning therapy. Ulcerative esophagitis, acute and reactivated gastric and duodenal ulcer with perforation and hemorrhage, ulceration and perforation of large bowel, occult G.I. bleeding with anemia,

gastritis, epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, epistaxis, anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fetal and nonfetal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomata, aggregation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with overdosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement. (B)98-146-800-F (10/71)

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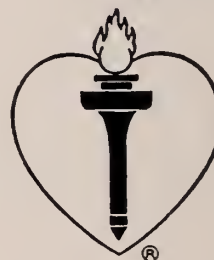
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President's Letter



Casting Stones

My personal observations of drug use, abuse, and the drug subculture have caused me grave concern. I have been unable to substantiate as true much of what I was taught and until recently, much of what I read. Cullen's historical article in this issue* with the benefit of hindsight, relates several instances where organized medicine's positions on marijuana were inaccurate or may have been culturally biased.

Recently NBC produced "What Price Health." Medicine's reaction was instant and factual. Bias and inaccuracies utilized in support of a specific cause, i.e. Kennedy's health care delivery system, resulted in a point by point rebuttal.

The common denominator of these unrelated instances is objectivity and reminds me of Jesus's teaching, "Let him who is without sin cast the first stone." Each of us has a right to an opinion and a right to act in support of that opinion especially concerning important social issues including health care and drug abuse. Those rights should not be exercised unless coupled with the responsibility of becoming knowledgeable of the subject under consideration. As physicians, our professional opinions will stand the test of time most often if we are scrupulously honest in labeling them as factual or conjectural or as mixtures of both. To act otherwise would be to cast a stone.

*See page 223.

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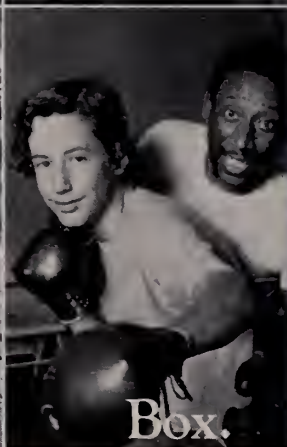
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Chemical Dependency*

An Overview

REYNOLD A. JENSEN, M.D.†

THE TIME—Summer of 1967. The place—the Haight-Asbury District, San Francisco. The Occasion—The Summer of Love.

Thousands of young people from every corner of the U.S.A. gathered to celebrate "The Summer of Love" and to participate in the anticipated joys of the psychedelic movement which had been gaining momentum since the late fifties. "The adolescents were naive and impressionable. Like their contemporaries in other sub-cultured settings, they had come to the Haight-Asbury with no money, expecting to be cared for in the hippie communes and planning to test themselves by experimenting with drugs. Most wanted love and understanding as well as stimulation. When they did not find it, they usually started living on the street, where they could not fend for themselves."¹

As might have been expected, the summer ended in disillusionment. The result: a rapid acceleration of the "drug problem" in other areas of the country. It is as if the "Summer of Love" was the spark which ignited the smoldering but growing problem which had been previously ignored by too many of us. Four years later, June, 1971, President Nixon declared "America's Public Enemy No. 1 is drug abuse."

The purpose of this discussion is: (1) to present a brief historical review of drug use and associated dependency, (2) to contrast the present scene from those which previously had existed and (3) to suggest a number of contributing factors to the current dilemma which confronts us all.

Historical Perspective

For reasons little understood man from time immemorial has had the "belief" that something "magic" happens when certain kinds of sub-

stances are ingested. This mystical belief still persists and may be stronger than ever before. Few of us physicians have escaped the request by our patients "give me something to make me feel better."

The process of fermentation was discovered by early man about the time he became an agriculturist, i.e. 7000 B.C. Beer and wine were used by the early Egyptians who were also acquainted with opium (1500 B.C.). The Chinese were recommending the use of marijuana as far back as 2700 B.C. and were using tea. Two thousand years later marijuana was introduced into India and later into the Near East and surrounding areas. Brandy or "burnt wine" was introduced into Europe about 1000 A.D. Ale and mead were used liberally by the Vikings.

At the time America was discovered, the Incas were using cocaine and chewing the betel nut. In Central America and Mexico peyote and certain mushrooms were used primarily for religious purposes. The process of fermentation was used to produce beers and wine. "Drunkenness" was considered a crime by the Aztecs except in the case of an older man. The North American Indian was growing and using tobacco.

With the exception of very few cultures such as the Eskimos and Australian Aborigines, man was using some "magic" substances in one form or another. Could it be man's tolerance for socialization requires something "magic" to help in the process?

Beginning in the sixteenth and extending to the nineteenth century profound social and cultural changes were occurring in Europe. Trade and travel increased as did the population. The feudal system began deteriorating which resulted in a slow but steady drift by many to the cities.

The development of the steam engine which began the Industrial Revolution in Great Britain during the eighteenth century produced profound changes in the social structure of that country

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*The term "Chemical dependency" in this discussion includes the ingestion of any and all kinds of chemicals or drugs ranging the spectrum from caffeine to the so-called "hard" drugs such as heroin. The assumption is that "dependency" whether psychological or physical stems basically from similar sources. The terms "chemical" and "drugs" will be used interchangeably.

and subsequently elsewhere. Peasants accustomed to living on the land were solicited to work long hours in the factories. "The discovery of steam as a motive power has 'mechanically' forced the close packing of abodes, the dispersions of the functions of the family, the odd phenomenon of persons working and living in close proximity without the development of intimacy ties."² They with their families lived in crowded, sordid surroundings which soon became the ghettos, and with this developed increased frustrations, dissatisfactions and tensions. Alcohol seemed to provide the means for release.

In 1700 A.D. Great Britain was producing 300,000 gallons of spirits. By 1750 A.D. 11,000,000 gallons were produced, almost a four-fold increase, and with it abuses developed. These assumed such proportions that counter movements emerged to control its use. The English "Pub" System was established, and the manufacture and wholesaling of whiskey and beer was separated from retailing.

In addition to the increased use of alcohol during this period, opium in its several forms was freely available. Its use was confined largely to writers, artists and the gentry.

Circumstances were similar in the United States during this period with corresponding efforts initiated to develop effective controls. The Whiskey Rebellion represents the first organized effort to resist governmental control of the manufacture of alcohol.

Discoveries during the nineteenth century inadvertently contributed much to the current problems of abuse and dependency. Morphine was isolated in 1805, codeine in 1823 and heroin was synthesized in 1898. The hypodermic needle was invented in 1843.

Morphine was used liberally in the treatment of the sick and wounded during and following the Civil War. Many became morphine dependent. Patent medicines and other nostrums containing opium in one form or another and generous amounts of alcohol were sold cheaply without prescription in drug stores and general stores in the rural areas.

The addictive nature of opium was not appreciated until the beginning of the twentieth century. Once recognized, public attitudes toward its use changed and corrective measures were initiated. Clinics were established for the treatment of those

addicted and the national government began to develop a set of controls. Governmental action was stimulated by the marked increase in opium smuggling.

Marijuana used extensively in Mexico, Central and South America was introduced to the Western World sometime during the nineteenth century. Introduced to the United States in the twenties, its use was confined mainly to the Mexican-Americans, blacks and poor whites in the south and southwestern sections of the U.S.A.

Phenobarbital, first synthesized at the turn of the century, led the way to the development of an increase number of related compounds.

The amphetamines were first introduced in 1927. Two of the latest members of this group to appear on the scene are methamphetamine, hydrochloride and methyl-dioxy-amphetamine synthesized in 1969.

Lysergic acid diethylamide (LSD), accidentally produced in 1938, has been used primarily for medical research, and of late as an adjunct to help patients with chronic terminal illness.

Mescaline, the active principal of peyote, has been recently isolated and is available.

The tranquilizers, major and minor, and the anti-depressant chemicals have appeared on the scene as recently as the mid-1950's. Abuse in these groups has been largely confined to the minor tranquilizers.

Many other chemicals (drugs) have appeared on the market. There are many more today than were available at the turn of the century. The use of drugs is nothing new. The question may then be asked "What is so different about the present situation in 1973?"

Prior to the current scene, the number of persons taking drugs and abusing them was relatively small and confined largely to the ghetto districts of the large cities. True, others were involved, entertainers, musicians as well as a few members of the medical profession, but again the incidence was small. Today the total number of persons using chemicals in one form or another has exploded to such proportions that it is impossible to formulate an approximation.

Fort puts it this way: "If you pick 20 adults at random, the odds are that 15 of them drink moderately, two are problem drinkers and one is a desperate alcoholic. Two who use alcohol are also using marijuana; a couple are taking tranquilizers on doctor's orders and one or two has been

popping barbiturates to relieve insomnia and is perilously close to addiction. Three or four have taken amphetamines to stay awake or lose weight and are perilously close to addiction, and nearly all of them drink caffeine, another stimulant. Ten or 12 of this group of 20 continue to smoke tobacco even after the medical hazards of that habit have been amply documented. One has probably taken acid or mescaline. The children of some have snuffed glue or carbon tet for kicks (thereby risking brain and liver damage), more smoke pot and some have had LSD trips."³

He further emphasizes that approximately 500,000 to 1,000,000 of the 35,000,000 who use drugs (mostly on prescription) have become abusers; there are 10,000,000 users of marijuana and 1,000,000 have used LSD or other psychedelic chemicals.

The National Institute for Mental Health (N.I.M.H.) estimates there are 250,000 heroin dependents in the U.S.A. as of June, 1971.⁴

Of additional concern is the increasing number of children and young people ranging from age six to 30 years who are becoming involved with chemical use and abuse. A recent report issued by the Fleischmann Commission appointed by Governor Rockefeller of New York to study education in New York City states: "Nearly half of the high school students in the nation's largest public school system are on drugs, and in the junior high grades the percentage is 20 percent. This heartbreaking phenomenon is spreading with what appears to be an epidemic in suburban and rural areas as well."⁵

A similar situation is paralleled in the urban, suburban and rural schools in Minnesota.

The number of different chemicals (drugs) and combinations available today are enormously greater than at any time in the world's history. Heroin is in good supply though its availability is being curtailed by vigorous governmental action. The prescription drugs, particularly the barbiturates and amphetamines, are apparently manufactured in amounts in excess of medical requirements, for they are easily available on the street. The adulteration of drugs by the illegal vendors is a common practice which increases the hazards. The addition of strychnine and other adulterations has led to the establishment of drug analysis centers. "Almost 90% of the street samples are not as advertised. For example, illicit mescaline upon analysis may be LSD, DOM or PCP and

THC may be PCP (scrynl, a potent chemical anesthetic) or benactyzine. 'Bad' or mislabeled drugs, coupled with increased and indiscriminate experimentation, have contributed greatly to the increase in adverse reactions."⁶

The hypodermic needle has led to an increased use of the intravenous route for administration with its attendant hazards, notably hepatitis.

The cost in terms of lives, money, absenteeism is alarming. In 1971, 1,154 deaths from heroin overdose occurred in New York City.⁷ The numbers today, no doubt, have increased.

A significant increase in the number of "junkies" (an individual dependent on heroin) has resulted in a significant increase in crime ranging from assault-robbery, prostitution and dealing in illicit drugs to secure the necessary funds to maintain the habit. Costs vary from \$50.00/day upward to \$400 per day.

The National Institute on Alcoholic Abuse and Alcoholism estimates \$10 billion is the annual cost for lost work time in the labor force, and an additional \$5 billion is the cost of welfare payments and damages to health and property.

Factors Contributing to the Present Dilemma

Most significant is the profound and accelerated changes in our social order since the early forties. The demands of production during World War II brought an influx of women into the labor market which continues to the present time. Equal rights legislation recently enacted assures not only the place for women in the labor force but also equal opportunity for wages and position. Family patterning and living will continue to change.

Our national economy has shifted from an agricultural base to one of manufacturing, commerce and service. This has resulted in a population shift to burgeon the large metropolitan and suburban areas.

It is estimated one-third of the total population is mobile, on the move continuously. The majority are the skilled technician, scientific, business, manufacturing and industrial personnel including many wives and children. The population explosion which only recently is slowing down has contributed to the current scene.

We no longer reckon distance in terms of miles, but rather in terms of the time it takes to get from one place to another.

As a result a new concept has emerged, "transience" which means "temporariness," in every

facet of our daily living including our every day human relationships. "And it is precisely these relationships that, as acceleration occurs in society, become foreshortened, telescoped in time. Relationships that once endured for long spans of time now have shorter life expectancies. It is this abbreviation, this compression, that gives rise to the almost tangible feeling that we live, rootless and uncertain, among shifting dunes."⁸

It does not require much imagination to discern the dilemma of youth. "Who am I?" "What can I look forward to?" "Are there any enduring values?" "If all is transient, what is there?"

Is only youth troubled and bewildered? May it not be, if we are candid with ourselves, that *all* of us are involved with the same dilemma?

As "transcience" gained momentum, it was inevitable that efforts "to stem the tide" should emerge. As in the past it is the writer, the poet, artist, musician and on occasion the scientist who is in the forefront of change: Ginsburg, the poet, Watts, who introduced the Zen movement to the nation, Huxley, the scientist who wrote "Doors of Perception," and the Beatles, the musicians. They with many others initiated the protest by developing and encouraging a new "life style" in the early fifties. Bluejeans, sandals, long hair emphasized resistances to advancing technocracy. Pre-occupation with eastern mysticism, the new philosophy of Sartre, the French philosopher, also characterized the protest. Leary, high priest and messianic leader of lysergic acid diethylamide use as a new promise for the future, supported by generous press coverage, provided impetus not only to the further expansion of the subculture but also to stimulate an increase in chemical use. It was not long after the lysergic acid diethylamide explosion that the use of marijuana increased to be followed by experimentation with any substance which gave promise of providing "a high."

Increased interest in and use of drugs stimulated the expansion of the illicit trade which has flourished despite best efforts to combat it. The "pusher," the local dispenser, is almost ubiquitous. Chemicals are illegally produced by individual operators, adulteration is rampant and all too often drugs produced by the pharmaceutical industry are available on "the street."

"The influence of the news and advertising media has exerted its influence by emphasizing the

emotional nature of many problems. For example, the hard-sell propaganda oriented to the here and now concept of living and employed by all commercial enterprises, may have been a catalyzing factor in increasing the misuse of drugs among young people. They are particularly attuned to the notion of instant joy, instant pleasure and instant solutions to all life problems. Whether or not these results are real, most authorities agree that the tremendous and almost unprecedented early publicity given to the sensory-enhancing and psychic effects of LSD and its evangelical prophets added to the 'contagious' nature of drug taking . . ."⁹

The continuous insidious "conditioning" to accept drugs as *the* essential in solving life's problems goes on from early morning to late at night on T.V. Take a pill and presto, instant relief is yours. And you don't need a physician!

The phenomenal expansion of the pharmaceutical industry requires mention. This increase has been explained in part by the increase in the population and attendant incidence of illness, the cost of new drug production, the increased ability to pay for drugs either as individuals or by welfare agencies providing payment for the indigent and poor.

It was inevitable that the "advertiser" enter the intense struggle not only to sell the products produced but also for the physician's attention.

Irrespective of the merits of the union of the pharmaceutical industry and the "advertisers" the combination has contributed to the dilemma of the current scene.

Unknown as yet is the influence of the war in Vietnam. Known, however, is that this war is different from all others in that drugs of all varieties were easily available and freely used. The extent of abuse is yet to be determined.

Abuse leading to dependency problems and its attendant miseries is no new problem. Differences presently existing require careful study and cooperative effort to develop ways and means to place the problems in perspective, to establish priorities and hopefully to devise programs of united effort to reduce abuses with attendant sufferings and tragedies.

Willingly or unwillingly, we physicians are an integral part of the scene. Along with others we can help evolve more satisfying and rewarding ways to meet life's situations.

⁸ See references on page 191.

Dynamics of Drug Dependency

RICHARD O. HEILMAN, M.D.*

*I woo with every charm the tempter knows
I promise comfort with a secret leer
I soothe with liquid fire that smoulders with desire
And leaves the ash of caution as it glows.*

*I lead you down a path so smooth and gay
The spectre at the end you do not see
Until you find you must depend on me
To fight the growing panic on the way.*

*And at the end, I leave you to your fate
To learn what I have done to you, too late!*

THIS POEM BY BASSETT has narrated exceptional insights into the dynamics of drug dependency.

The purpose of this paper is to discuss a new direction in the concept of these dynamics and to dispell the assumption that a psychological or emotional disorder causes drug dependency. Too long drug dependency has been regarded a "symptom" of an underlying personality disorder. Over the last decade workers in the field of alcohol and other kinds of drug dependencies have become increasingly perplexed, frustrated, and finally disenchanted with this theoretical construct as applied to the dynamics of drug dependency. Efforts in the field of psychiatry and psychology to relate the development of a drug dependency to a negative psychology, have been hard pressed to successfully ascribe personality types or even common personality characteristics which consistently render one vulnerable to becoming drug dependent. Attempts to correlate drug dependency and psychological maladjustment have been unsuccessful and therefore, indicate an erroneous, useless concept—a concept which frustrates preventive measures and treatment efforts. One of the few facts known about drug dependency is there are as many different kinds of personalities developing this problem as there are different kinds of people. The proportion of individuals in an alcohol or other drug dependency treatment unit having significant psy-

chological problems is no greater than the proportion of psychologically disturbed people in society. No longer can alcoholism or any type of drug dependency be regarded as a consequence of an underlying psychiatric disorder.

Consider the acceptance of our society of intoxication as an institutionalized form of problem solving. Ninety three million people use alcohol. The majority use it recurrently as a tranquilizer or tension reducer. The utilitarian effect of this drug is exploited as a socially accepted medication. The great majority of drinkers do not become alcoholic. Millions use sedative tranquilizers to cope with the day and sedatives to induce sleep at night as a way of solving problems of anxiety or sleeplessness. The great majority do not become physically or psychologically dependent on drugs. Thousands use intoxication by stimulants to help solve the problem of overweight. Few become psychologically dependent. Therefore, the simplistic model which states that using a chemical substance to resolve or escape from a problem is the cause of drug dependency is seriously inadequate. Could drug dependency be explained on the basis of something intrinsic in an individual? Could it stem from a healthy intention, motivation, drive, or need? Historically man has used great varieties of herbs, roots, leaves, plants, ferments, extracts, and finally synthetic substances to aid him in experiencing and perceiving the world and himself in other dimensions. Substances apparently provided man a short cut to this human capacity as he increasingly lost the ability to make these experiences available to himself. A recent book *The*

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Natural Mind by Weil,² presents a new and fascinating concept. Namely that man has always had a strong innate drive and capacity to experience many different levels of consciousness. This need is as vital to mental health and a fulfilled life as the satisfaction of any innate need. Though Weil presents a formidable discussion to substantiate this as a credible idea, it lacks, measurable scientific evidence. Empirical evidence however, suggests support to the theory. Reference is made to Weil's theory only to interest the reader in the positive dynamics of recreational drug use and dependency. It is not my purpose to dwell on Dr. Weil's sophisticated theories but to discuss the special unique response some people have to drug use and to relate this hopefully to the dynamics of drug dependency.

A symptom of drug dependency seldom described or discussed in the literature is "preoccupation." Preoccupation is a recurrent cognitive and emotional experience human beings have when they discover something in life which becomes profoundly meaningful to them. Preoccupation with money, power, and sex is a daily experience for many people. Falling in love with someone and the recurrent preoccupation of thinking about the loved one throughout the day is probably the best example for us to understand the nature of preoccupation. The persistence of the image of the loved one recurrently invades conscious thought followed by intense feelings of warmth, tenderness, love, and desire, blocking out all other thoughts.

It is proposed that becoming enamored with the experience of "getting high" is similar "to falling in love." Recurrent preoccupation with the next time "to get high" is the first symptom and the hallmark of drug dependency. Preoccupation with the drug and the "high" is of such consequence that, if it could be objectively measured and evaluated, diagnosis of drug dependency could be established by measuring its intensity and frequency. Herein lies the difficulty in recognizing early drug dependency before complications develop to make it obvious. Preoccupation is wholly a subjective experience, one can only try to determine its presence, and when so determined, then proceed with questioning regarding the pattern of use of the drug to reach a diagnosis.³ Preoccupation was considered only to further suggest that its development seems to result from more than just the reduction of negative feelings. The drug dependent *reaches*

for rather than is *driven to* alcohol or other drug use.

Drug dependency has four characteristics: (1) An overwhelming recurrent urge to repeat the experience of intoxication—a loss of choice. (2) The strength of this urge transcends innate needs or learned needs. It is so powerful it achieves primacy as a need which requires recurrent fulfillment. (3) The urge to repeat the experience of intoxication becomes autonomous. No external or internal stimulation is necessary to trigger it. (4) Once an individual has become psychologically dependent on a drug there is no so called "cure." The experience has become so deeply imbedded or indelibly etched in the person's experience it can never be consciously or unconsciously "forgotten." Bejerot⁴ has stated, "Addiction has the strength and characteristics of a natural drive; it may be considered as an artificially induced drive developed through chemical stimulation of the pleasure center."

Only by understanding these characteristics will the dynamics based on the positive reinforcement for the pleasures of intoxication be clear and creditable. One, who becomes psychologically dependent, must experience a very exceptional pleasure in intoxication which is qualitatively and quantitatively different. It is the crucial and predominant factor in the causation of drug dependency. Terms used to describe this exceptional quality of intoxication are "champagne effect," "Cloud 9 effect," "tincture of ecstasy," "total body orgasm" to mention a few.

Though little understood, drug idiosyncrasy, when it occurs in treating patients, is meticulously respected. Mood and/or mind altering drugs have comparable reactions in some individuals. In illustration, the most widely used drug, with which most physicians have had experience, is alcohol. Individuals who drink alcohol may react in one of several ways:

A small percentage of people have a definite adverse reaction to the effects of alcohol. After ingesting an ounce or two they may experience disagreeable symptoms such as a tingling or numb feeling in various parts of the body; a headache of a throbbing variety; nausea, and vomiting. They may find the loss of mental and physical efficiency disagreeable. Because of this adverse effect they do not drink, even under social pressure. It makes them ill, "Why"?

Some who drink experience no particular pleasure or euphoria nor any significant sedative or relaxing effect. They may drink occasionally under social pressure.

By far the largest group are the social drinkers. They experience a positive euphoria or pleasure and a significant degree of tranquilization or relaxation which is enjoyable. They do like to drink, not only for its positive psychological and physiological reaction but also for the powerful symbolic meaning of communality involved in doing so. However, social drinkers, when confronted with a possible danger in any area of their life—be it physical, psychological, social, family, or economic—are able to control it or relinquish its use with reasonable ease.

It is generally agreed that one out of ten who drinks becomes an alcoholic. The positive pleasure of getting "high" is observed to be qualitatively and quantitatively different in such an individual. For reasons as yet unknown, alcohol acts predominantly and paradoxically as a stimulant rather than a sedative or depressant. The alcoholic's drinking begins where the social drinker's terminates. For a long time the mystery of the remarkable capacity of the alcoholic to drink enormous amounts and remain remarkably efficient physically and mentally has evaded us, but the fact of his unexplainable tolerance has been demonstrated. Davis and Walsh⁵ theorize that acetaldehyde from ethanol metabolism alters dopamine pathway, resulting in formation of morphine-like alkaloids. A decade of research has led them to postulate that alcohol metabolism follows a different pathway based on individual constitutional variation. Currently investigation by eight different medical research centers in the field of drug dependency (besides alcoholism) is designed along this theoretical line. Narcotics, stimulants, sedatives, and hallucinogens have different effects on different people which cannot be explained on a psychological basis. Therefore, any theory of dynamics of drug dependency must begin with the premise that the drug dependent individual experiences an "exceptionally" different response from the "average person."

The acceptance of this premise does not exclude psychological or sociological factors in the dynamics of drug dependency, whether they be of positive or negative characteristics. They, however, are secondary to the difference in drug response! The drug has to be available and circum-

stances of its use have to be reasonably favorable dependent on the orientation of the particular group or society with which he is identified. Society presently constitutes fertile soil for development of drug dependency.

Milam has convincingly emphasized predisposing neurological physiochemical considerations as primary factors in drug dependency.⁶

Experience with many thousands of alcohol and other drug dependent people reveals a remarkably similar pattern in the development of most cases of dependency, as illustrated in the case of "Mike."

Mike is anybody who could come from the ghetto, urban society, a small town, or suburban area. He could come from a family of any size, any means, any creed or religion, and any ethnic background. His value system, interests, philosophy, and goals in life could be of any persuasion. The only specific requirements for Mike to become drug dependent are that he is social minded and values the opinion of his peers. He could come from a family which has a positive attitude about drinking and uses alcohol in responsible ways, from a family which accepts heavy abuse of alcohol, or a family which prohibits use of alcohol. Mike may or may not have had prior drinking experience within the family setting. In his early teen years, generally in the company of his closest friends, he surreptitiously experiments with alcohol probably obtained from a parental or illegally acquired supply. Under the cover of darkness, in somebody's car, or behind the school, he drinks with considerable curiosity and significant excitement. The majority of his peer group approves of this behavior and promotes it persuasively. The drinking is done in an atmosphere of mutual trust and friendship. For Mike, the first experience of intoxication is exciting, adventurous, stimulating, joyful, and may be hilarious. The remarkable feeling of well being Mike experiences exceeds or at least equals any personal experience he has had. Though he may later become ill or experience a hangover, such side effects seem incidental to the enriching experience of getting "high." In our society Mike has no reason not to repeat the experience as often as possible. Ultimately he makes a commitment to incorporate the experience of alcohol intoxication into his life style—weekend dances, activities, stag parties, beach parties, or celebrations of any kind. It is this acceptance and commitment to enjoying the state of intoxication

which marks the onset of psychological dependency on getting high. It is easier to understand drug dependency if this initial commitment to this positive pleasure is understood. To quote again, "I woo with every charm the tempter knows and I lead you down a path so smooth and gay"¹ is the beginning of drug dependency.

It is at this point in Mike's life that he repeats the experience of getting high whenever it is convenient to drink "socially." Within the next six months to two years Mike will repeat the experience of getting high sufficiently often so that he develops an irreversible psychological need to repeat the experience.⁷ In the youth drug culture of today it is an easy step for Mike to use other substances to experience other kinds of intoxication. Intoxication is the "hooker" in drug dependency and whichever drug accomplishes this becomes a part of the drug dependency game of intoxication. As time goes by, Mike inevitably encounters an infinite variety of dependency complications. They may be physical, social, legal, marital, or economical problems. Ultimately he uses intoxication as a refuge or an escape from the attendant tensions. The use of intoxicants as a refuge or problem solving technique, "to fight the growing panic on the way,"¹ serves to reinforce secondarily, the primary psychological dependence. What we have at this time in Mike's life is a psychologic dependence based on positive rein-

forcement for pleasure and a secondary psychic dependence on the drug experience based on negative reinforcement to avoid pain. The trap is now complete and Mike is hooked. Recurrently he will encounter complications of tragic magnitude and variability. As all human beings abhor being rendered helplessly dependent on anything, Mike will develop an elaborate system of defense to protect himself from acknowledging he has been rendered dependent on drugs. Repression, rationalization, projection and denial are the defense mechanisms most often used. Typically these are so successful in accomplishing their purpose that Mike is the last to appreciate his dilemma. In addition, getting "high" becomes a "people" substitute with the tragic result Mike experiences recurrent depression, anxiety, and sometimes despair at his feelings of alienation and loneliness. Mike loses his skill to communicate meaningfully with "important" others, and he remains in a suspended state of growth. Rendered unstable, Mike's immature feelings and inadequate methods of relating to others emerge to dominate his total personality. It is painful to be with Mike because he exhausts people with his egocentricity. Mike's need for interpersonal intimacies go unmet and his tragedy is complete. "And at the end, I leave you to your fate to learn what I have done to you, too late."¹

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Health Professionals Drug Abuse Education Project

In 1972 the subcommittee on Alcoholism and Drug Abuse of the Minnesota State Medical Association, (MSMA) supported a request for funding through the National Institute of Mental Health of a Health Professionals Drug Abuse Education Project for Minnesota and contiguous parts of adjoining states. One of the co-directors of that project, Robert G. B. Bjornson, is a member of the Subcommittee, and the other co-director is William Hodapp, Assistant Professor of Clinical Pharmacy, and Health Sciences Coordinator for Continuing Education. The aim of the project is to provide educational opportunities for health professionals in drug-related matters. The team presented its first evening workshop in Hibbing and its first general seminar in Duluth in January. Information about this project may be had from:

James Rothenberger, Coordinator,
Health Professionals Drug Abuse Education Project,
7208 Powell Hall, University of Minnesota, Minneapolis, Mn 55455.
(612) 373-9813

Behavioral Aspects of Drug Dependence

ROY PICKENS Ph.D.* AND RICHARD A. MEISCH, M.D., Ph. D.*

MOST BEHAVIORISTS view man's activities as being controlled by consequences. Acts that are rewarded are repeated, and acts that are punished are avoided. Not everyone finds the same events rewarding or punishing, however, but in general most people are similar in what they like or dislike.

In the experimental analysis of behavior, events that function as rewards by strengthening the behavior they follow are known as *reinforcers*. A number of events will function as reinforcers of behavior. Some of these (water, food, sex) are directly related to the survival of the individual or species. Others (social attention, praise) are not so directly related to biological function, but serve as powerful reinforcers nonetheless.

Certain drugs can also be viewed as reinforcers, since the behavior leading to their use will tend to be repeated.^{1,2} The reinforcing effects of these drugs strengthen the behavior leading to their administration, thus producing "drug-seeking" behavior in the same manner that food functions as a reinforcer to produce "food-seeking" behavior in a hungry organism. *Psychological dependence* is the term that refers to drug-taking behavior that results from the reinforcing property of drugs.

How is reinforcement involved in drug dependence? First, as mentioned above, drugs can serve as reinforcers in their own right, strengthening the behavior that leads to their presentation. Secondly, drug use can make other types of reinforcers available to the individual. Finally, drugs can increase the reinforcing properties of available reinforcers.

Drugs as Reinforcers

Drugs can function as reinforcers by producing a pleasurable state (positive reinforcement) or

terminating an unpleasant one (negative reinforcement). With chronic, high-dose use, opiate and depressant drugs cause physical dependence. If the administration of these drugs is abruptly discontinued, the individual experiences the aversive state of withdrawal. Resumption of drug use will terminate the withdrawal symptoms, and thereby serve to reinforce the behavior of drug taking. That these drugs also have positive reinforcement characteristics is suggested by the fact that individuals will persist in their use sometimes under conditions that do not result in physical dependence.

The chronic, high-dose use of other classes of drugs (e.g., stimulants, hallucinogens) does not produce physical dependence like that seen with the opiate and depressant drugs. The use of stimulants and hallucinogens is therefore controlled primarily by the positive reinforcing characteristics of these drugs.³

Drugs and Other Reinforcers

While drug taking is maintained by drug-reinforcement effects, it is also maintained by other extrinsic reinforcers that drug use provides. Drug use, particularly in adolescents, is often accompanied by strong peer group interest and approval, both powerful reinforcers in their own right. On the other hand, failure to use drugs may yield peer group contempt and disapproval. Both factors could explain why certain drugs are taken with no known psychoactive constituent (e.g., in smoking banana peel).

Making Other Reinforcers More Reinforcing

Frequently, drug taking is maintained by the change it produces in the individual's other behavior. Psychoactive drugs typically cause a variety of behavioral effects. If the individual should find one of these reinforcing, it would indirectly strengthen the behavior of drug taking.

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For example, alcohol tends to release behavior being suppressed by fear of punishment. For this reason it is frequently served at parties to "break the ice" and thereby increase social interaction. Since most people find increased socialization reinforcing, the use of alcohol can be maintained by this indirect action of the drug. Other drugs can also have similar effects on drug-taking behavior.

Reinforcers as a Class

What makes a drug, or any other event for that matter, function as a reinforcer? Why does cocaine or heroin serve as a reinforcer, while another drug does not? At present nobody knows. A number of events are known to function as reinforcers in animals, and considerable research is being conducted to determine the physiological and biochemical changes that correlate with reinforcing effects. At present, however, we simply do not know what unique biological or physical characteristic of an event endows it with behavior-controlling properties.

Some people have suggested, at least at the human level, that a reinforcer is any pleasurable event. However, they are then faced with defining what is meant by a pleasurable event. Since no one has been able to do so satisfactorily, little is accomplished by such a definition.

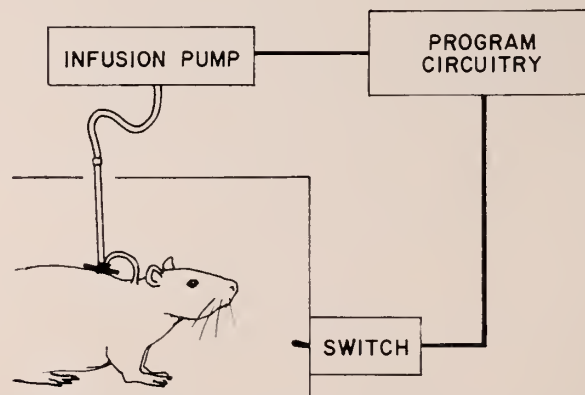
Reinforcement is a description of a behavioral process, in which an event comes to strengthen the behavior it follows. Thus, a reinforcer is not determined *a priori*, but rather by its effects on behavior.

Advantages of Reinforcement Interpretation of Drug Dependence

What, then, are the advantages of viewing drugs as reinforcers? There are actually three important benefits derived from doing so. The first is that the application of the concept makes the behavioral study of factors controlling drug dependence experimentally possible. Previously, drug-taking behavior was considered to be a problem of the mind, the result of a disorganized or sick personality. It was believed to be controlled entirely by factors which lay within the organism, and were therefore not amenable to scientific study. The reinforcement interpretation of drug dependence, on the other hand, views drug-taking behavior as the result of a number of objectively-defined variables which have already been found to control behavior in general. Whereas the effects of such variables can be experimentally determined on drug-taking behavior, the effects of the mind cannot. The concept of drugs as reinforcers has therefore led to a change in emphasis on the factors which control drug-taking behavior.

Predictive Significance

The second advantage of the reinforcement interpretation of drug dependence is in suggesting methods for predicting the dependence liability of drugs.⁴ According to this interpretation, since dependence-producing drugs are drugs which serve as reinforcers, techniques which demonstrate the reinforcing properties of drugs can therefore be used to assess drug dependence liability using ani-



Figure—Apparatus for studying drug dependence experimentally in animals. A level press activates an infusion pump for a specified time, delivering a fixed amount of drug solution through a chronic jugular catheter and into the animal's bloodstream. Swivel joints and flexible tubing allow the animal unrestricted movement in the cage chamber.

imals as the experimental subjects.⁵ Since one characteristic of reinforcers is to strengthen or make more probably the behavior they follow, one test of the reinforcing properties of a stimulus is to present the stimulus after each occurrence of a specific instance of behavior, and determine whether the behavior increases in frequency and has therefore been strengthened. If the frequency of responding increases, then the stimulus can be said to be serving as a reinforcer.

For example, if food is presented each time a hungry rat presses a lever, then the frequency of lever pressing will increase, indicating that food is serving as a reinforcer. Likewise, if each lever press results in the administration of a drug and the frequency of the lever pressing increases, then the drug can also be said to be serving as a reinforcer and therefore would be expected to possess dependence liability. If the frequency of lever pressing does not increase, however, then the drug is not effective as a reinforcer, and consequently it would not be expected to produce dependence.

In the lever-pressing situation, since responding by the animal is responsible for the drug delivery, the animal can be considered to be self-administering the drug. Consequently, these methods are called drug self-administration techniques. The Figure shows a schematic representation of the apparatus used in the study of intravenous drug self-administration by rats. The Table shows the drugs found to be self-administered by animals using the self-administration technique. As can be seen, animals self-administer essentially the same drugs that humans abuse.

Recently, rats have been found to self-administer the levo isomer of both amphetamine and methamphetamine, which humans apparently do not abuse.⁶ This finding suggests that *l*-amphetamine

and *l*-methamphetamine have reinforcing effects, and that the absence of abuse reports of these drugs in humans may be related to drug availability, peripheral side effects, or other factors.

It is interesting that the behavioral characteristics of animals' self-administering drugs are very similar to those of humans dependent on the same compounds. This latter point can be illustrated by comparing the self-administration of stimulants by the rat with stimulant dependence in man. With rats, the self-administration of stimulants is characterized by responses which are separated by long but regularly-spaced intervals. The length of the interval between successive self-administration responses is determined primarily by drug dose. When infusion dose is increased, the interval between responses also increases, and consequently fewer drug infusions per hour are taken. Similarly, when infusion dose is decreased, the interval between responses also decreases, resulting in more infusions being taken per hour. The effect of this behavioral regulation is to maintain an almost constant rate of drug intake.

A second characteristic of stimulant reinforcement in rats is the appearance of drug intake and abstinence cycles. Periods of drug intake typically last for 6-48 hours depending on the drug used, and are followed by abstinence periods lasting two to 24 hours. During drug intake periods the animals are highly excitable, do not eat or sleep, and for the most part engage in rather stereotyped body movements. Chewing of the front feet is typical under high drug doses. During abstinence periods the animals initially sleep and eat, followed by apparently normal behavior. Following an abstinence period of several hours, a new drug intake period will begin. Drug intake periods start abruptly with regular spacing of responses.⁷

With humans, similar patterns of behavior have been observed during intravenous stimulant dependence. Drug injections are regularly spaced, and periods of drug intake alternate with periods of abstinence. For example, the following pattern of intravenous amphetamine abuse has been reported for humans. "The drug is injected about every two hours around the clock, for a period of three to six days during which the user remains awake continuously. . . . Following a 'run' he 'falls out,' that is, he becomes so exhausted, disorganized, tense, or paranoid he ceases using the drug and goes to sleep. . . . The sleep lasts 12 to 18 hours following a three or four day 'run'.

TABLE

Drugs Self-Administered by Rats (R) and Monkeys (M)

morphine (R, M)	thiopental (M)
etonitazine (R)	cocaine (R, M)
codeine (R, M)	d-methamphetamine (R, M)
dihydromorphine (R)	l-methamphetamine (R)
methadone (R, M)	d-amphetamine (R, M)
meperidine (M)	l-amphetamine (R)
pentazocine (M)	SPA (M)
phencyclidine (M)	phenmetrazine (M)
ketamine (M)	methylphenidate (R, M)
ethanol (R, M)	pipradrol (R, M)
amobarbital (R, M)	tranlycypromine (R)
barbital (M)	nicotine (M)
methohexital (M)	caffeine (M)
pentobarbital (R, M)	hashish (M)
chlordiazepoxide (M)	Δ ⁹ THC (M)
secobarbital (M)	

However, the more extended the 'run', the longer the recovery sleep lasts. . . . Upon awakening he is famished, his paranoid state is largely dissipated, but he is still lethargic. At this point he is ready to resume the use of his drug. Reinjection terminates the lethargy and a new 'run' has started."⁸ As this description illustrates, the characteristics of stimulant self-administration are similar for both the rat and human, which adds supporting evidence to the validity of these techniques in predicting drug abuse liability.

Research Directions

A third advantage of the reinforcement interpretation of drug abuse is in suggesting future avenues for drug-dependence research. If drugs are serving as reinforcers, then they should possess many of the same characteristics that other reinforcers possess. Since behavioral psychologists have been investigating reinforcement phenomena for almost 70 years, much is known about the factors influencing it.

A number of factors are known to be determinants of behavior, including both genetic and environmental conditions. Antecedent variables that affect behavior and therefore could be expected to influence drug dependence include past drug history and motivational level. In this regard, prior experience with the drug or drugs in general, tolerance, and time since last drug administration in physically dependent organisms may be related to the probability of drug use.

Another class of variables includes current environmental circumstance. Specific environments (e.g., aversive, isolated, social) may define the conditions for the self-administration of different classes of drugs. By frequent and repeated association with drug use, certain aspects of the environment may also come to control drug use, increasing the probability of drug use when those aspects are present. Consider the rather high recidivism rate with alcohol and heroin after release from treatment. When returned to the former drug

environment, the stimuli associated with drug use frequently appear too strong for the individual, and drug use is resumed. Successful treatment of drug dependence could be enhanced if the environmental control produced by stimuli associated with chronic drug use could somehow be weakened. Such an approach has been taken for alcoholism in a pilot investigation with encouraging results.⁹

Reinforcement variables are yet another class of behavioral variables that may be expected to influence drug dependence. The type, magnitude, delay, and schedule of reinforcer presentation are important in determining behavioral effects. Reinforcer type and amount are inextricably found in drug dependence. That some drugs are more reinforcing than others is indicated by the "dependence liability" or probability that use will lead to dependence on a given compound. Also, since the magnitude of a drug's effect is related to administration dose, it is not surprising that relatively high doses are most frequently employed in illicit drug use.

Delay and schedule of reinforcement are also important in determining the rate at which drug dependence is acquired. Perhaps the greatest appeal of drugs is the immediacy and consistency with which they produce their effects. The shorter the delay between drug use and onset of effects, the faster will be the acquisition of drug-taking behavior. For this reason, intravenous drug use represents the greatest risk for producing dependence because of the immediacy of its effects.

Since the knowledge obtained can be applied to the study of drugs as reinforcers, we can expect the same factors which are operating in the acquisition, maintenance, and elimination of behavior controlled by other reinforcers to be involved in drug reinforced behavior. Research to date has repeatedly confirmed the reinforcement interpretation of drug dependence. Perhaps these findings can be applied in the near future to the development of new methods for understanding, controlling, and hopefully preventing drug abuse.

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Federal Response to Drug Abuse

GORDON T. HEISTAD, Ph.D.*

FEDERAL EFFORTS toward control of drug abuse were directed almost entirely at the supply side of supply/demand equation until the past half dozen years. About twenty years passed between the passage of the Harrison Act in 1914 and the establishment of two federal hospitals for treatment of narcotic addicts at Lexington and Ft. Worth. For thirty more years these two hospitals represented the entire (largely unsuccessful) federal effort to control drug abuse by reducing the demand for abused drugs. Finally, in 1966 the Congress passed the Narcotic Addict Rehabilitation Act with provisions for federal civil commitment of addicts undergoing treatment for their addiction and authorizing the funding of a few pilot programs in addict treatment on a voluntary basis. Several federal agencies began to develop significant programs to deal with various aspects of drug abuse by 1969 as indicated in the Table.

Federal funding for drug abuse control programs has mushroomed since 1969 to a present estimated annual level of nearly 600 million dollars in direct allocations. As these federal activities related to drug abuse began to accelerate, the Administration requested and the Congress established the Special Action Office for Drug Abuse Prevention in the Executive Office of the President. Its mission is to mobilize federal resources, set priorities on the "demand" side and coordinate such activities with law enforcement efforts to

deal with the "supply" side of the drug abuse equation.

Federal Law Enforcement

From the passage of the Harrison Act in 1914 to the Controlled Substances Act 1970, the federal approach to drug abuse law enforcement was one of consistent increases in the penalties for the possession and/or sale of controlled substances. The 1970 act began what might become a federal trend toward continued increase in penalties for major drug trafficking with selective decreases in penalty structure for possession and use of the controlled drugs. Penalties now vary from a one year prison term with a possibility of probation and expungement of the court records for first possession offenses to prison terms ranging from two years to 30 years for sales of the controlled drugs. Such penalties are doubled for sale to a minor. The ultimate penalty of life imprisonment is still provided for a continuing criminal enterprise involving sale. A special provision of that law specifies that the distribution of a small amount of marihuana for no remuneration shall be subject to the penalties which apply for simple possession.

A substantial portion of the increased funds for law enforcement has gone to provide increased personnel and support for the investigation and prosecution of those who possess and/or sell controlled substances within our national borders. However an increased proportion of recent funding is now being directed toward diplomatic efforts

TABLE
Approximate Federal Drug Abuse Budget Allocations By Functional Category
(Millions of Dollars)

Category	FY 69	FY 70	FY 71	FY 72	FY 73*
Law Enforcement	\$32.1	\$48.0	\$85.3	\$164.4	\$229.0
Treatment & Rehabilitation	25.2	32.1	78.8	189.6	230.2
Education & Training	1.6	9.6	36.8	64.4	64.4
Research, Evaluation, Coordination, Support	18.2	22.7	16.6	56.1	70.6
TOTAL	\$77.1	\$112.4	\$217.5	\$474.5	\$594.2

*Estimated prior to the President's veto of the H.E.W. Appropriation Bill, October, 1972.

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to curtail the foreign production and distribution of illicit drugs intended for United States consumption and for increased efforts to curtail the importation of such substances at our national boundaries.

Despite the much publicized recommendation of the National Marihuana Commission for decriminalization of private possession of that drug, there seems to be no evidence of compromise in the administration's opposition to such an action at this time. The official position of the Executive Office of the President as stated in its most widely distributed educational publication on drug abuse is:

"There is not enough information to estimate the adverse effects of marihuana if it were to be used on the same scale as alcohol. . . . Since it seems to be true that once a drug becomes an accepted part of the social fabric it is almost impossible to prohibit its use, many concerned citizens feel it is prudent to await the results of ongoing and planned studies before treating marihuana in the same way as alcohol."¹

Federal Treatment and Rehabilitation Programs

The federal drug abuse treatment effort is aimed primarily toward rehabilitation of narcotic addicts. To a large degree this reflects the administration and public concern for the high rate of property crime associated with heroin addiction. However it also reflects the relative dearth of evidence to substantiate the effectiveness of treatment programs for those who are dependent on or otherwise abuse drugs other than the opiates. Among the abusers of other drugs there is some federal support for therapeutic communities which emphasize drug abstinence, often in the traditions of alcohol treatment programs, and a somewhat larger support base going into crisis intervention programs in which the typical emphasis is upon minimizing the damage from drug use rather than upon total abstinence.

No one can doubt the authenticity of examples in which individuals have come out of therapeutic community and/or crisis intervention programs to lead dramatically changed and constructive lives. However there is a great deal of other evidence suggesting that a high rate of usage of many non-addicting chemicals is often temporary with or without treatment. The evidence suggesting that the treatment was crucial in the rehabilitation of graduates from such programs is largely testimonial in nature offered by charismatic leaders of

the treatment effort in a form that is not convincing to those who allocate treatment budgets. The continued funding of such treatment programs represents a belief among federal planners that they are of some value but the modest level of such funding is a reflection of doubts that can be dispelled only by systematic research of a kind that is not typically conducted or even permitted by charismatic treatment leaders.

Although systematic therapy evaluation in the treatment of addiction is also of limited amount and quality, there is convincing evidence that society benefits from heroin treatment programs at least through reduction of property crimes engaged in by untreated addicts in their effort to support the heroin habit.²

According to a Justice Department report³ it is probable that the public is receiving the largest crime reduction dividend per dollar from simple heroin detoxification programs. Approximately 5,000 addicts are undergoing detoxification, averaging 12 days in duration, at any given time. Although the vast majority of such addicts will soon return to their addiction, they typically remain abstinent and relatively crime free for a brief period of time and resume their heroin usage on a temporarily lower scale. The usual federal estimates conclude that at least 10% of the addict population is temporarily abstinent after detoxification at any given time. Since detoxification costs only a few hundred dollars per patient, the dividends in crime reduction are impressive.

Approximately 57,500 opiate addicts are estimated to be enrolled in some form of methadone maintenance treatment at a modest average cost of approximately \$1,500 per patient per year. Although there are arguments as to whether such treatment results in true rehabilitation, since the addicts remain dependent on an addicting substance, the social benefits to society in the form of reduced crime, increased employment, and savings in welfare, law enforcement, and court costs leave little doubt that such programs are economically sound.

A far smaller number of opiate addicts, approximately 8,000, are undergoing treatment in therapeutic communities aimed toward total abstinence. Success rates in such abstinence programs are difficult to estimate. Success rates are reported from 10% to 50% of those entering treatment while those who are responsible for such programs claim a substantially higher rate. Even though the cost

of such therapeutic community regimens is at least three times that of methadone maintenance, the federal drug abuse planners have advocated these programs as part of a multi-modality attack upon addiction. However, only a small minority of addicts will enter and remain in such abstinence programs.

An additional 17,500 opiate addicts are enrolled in abstinence programs through civil commitment on a state or federal basis. With provision of community after-care the success of civil commitment procedures appears to justify the costs which are typically intermediate between that of therapeutic communities and methadone maintenance regimens.

Almost immediately after the establishment of the Special Action Office for Drug Abuse Prevention in the White House, that office set as its first priority goal that "no one commits a crime to get drugs because he could not get treatment." In accordance with that goal, the number of federally funded narcotic treatment programs increased from 135 to 320 during fiscal year 1972. The number of addicts treated in such programs was more than doubled in the last six month period of FY 1972. Despite widespread concern that the Special Action Office would over-emphasize methadone programs at the expense of other treatment modalities, the fraction of federal treatment dollars devoted to methadone programs at the end of FY 1972 was slightly lower than at the beginning of the Special Action Office but the fraction of heroin addicts in treatment receiving methadone had increased because of the much lower daily cost with methadone as contrasted with abstinence programs.

Recently the federal government has initiated a new program, Treatment Alternatives to Street Crime (TASC) for setting up judicial and administrative procedures and increasing the availability of treatment resources within communities with a high rate of addiction to permit identification of the heroin dependent person shortly after arrest and the offering of special opportunities to enter a variety of treatment programs as an alternative to imprisonment. Organization of such a project within a community demands the active participation of city government, police, the judiciary, corrections, prosecuting and defending attorneys, as well as community based treatment and planning programs.

Federal Education and Training Programs

Appropriations for education and training in drug abuse as late as fiscal 1969 were minuscule and state and private sector investment were equally low. Even before the massive infusion of treatment dollars during the fiscal year 1972, there were large numbers of persons actively engaged in drug abuse treatment programs with no evidence of training and often with little significant drug related experience prior to their employment by such treatment programs. Advanced degrees in the health related sciences and professions were and are almost totally irrelevant to competence to deal with drug abuse health problems since our institutions of higher education have traditionally included no significant preparation for dealing with drug abuse in such training programs. Into this vacuum of specialized competence, the ex-addict and other former drug abusers were used to carry out treatment and prevention programs. To a degree probably greater than in any other health related field, drug abuse treatment and prevention is being carried out by para-professionals with a minimum of formal training.

The federal response to this unique manpower crisis has been to set up on an emergency basis seven regional training programs throughout the country for professional and para-professional workers in drug abuse treatment under the auspices of the National Institute of Mental Health. A parallel set of seven regional training centers for community drug abuse prevention teams has also been initiated by the U.S. Office of Education. These centers offer short term training of two weeks or less for those individuals who now have or shortly will have treatment or prevention responsibilities within their communities.

The National Institute of Mental Health has made available training grants to health professional schools for continuing education for graduates in the health related fields and a limited amount of pre-service undergraduate training. The National Institute of Mental Health is also prepared to fund one member of the faculty at each four year medical school for drug abuse studies and instruction.

Under federal law the licensure of drug abuse treatment facilities is delegated to the states. However it is probable that the federal government will become involved in credentialing individual drug abuse workers. Federal planners are committed to a credentialing system that emphasizes compe-

tence to perform rather than degrees or diplomas. Adequate training opportunities will be provided so that every professional and para-professional drug abuse worker will have the opportunity to meet federal standards through additional training.

The National Training Center became operational in the Washington area in June 1972 with a mission related to development and validation of training programs and techniques. Other large scale evaluations of the major drug abuse training efforts of the federal government are now in the late stage of planning and will probably be underway by the publication date of this article.

The U.S. Office of Education has been established as the lead agency for preventive education. There is no credible evidence that drug education in the schools by untrained teachers is effective. Indeed some evidence suggests a positive correlation between factual drug knowledge and at least some kinds of drug experimentation.⁴ Specialized programs aimed at specific target student groups taught by fully trained instructors may be of benefit in reducing dependence. The Drug Abuse Education Act of 1970 will expire shortly and it is probable that the Congress will infuse large scale funding into the field of preventive education in our schools, despite the lack of evidence for effectiveness of such programs.

The primary preventive education plan of the Office of Education is the "help communities help themselves" program through which individual communities (often small sections of larger metropolitan areas) are awarded small "minigrants" to send a team of five or six community leaders to one of the seven regional training centers for training. The education department of every state is also funded for pilot projects in drug abuse prevention within their school systems. The program is aimed at restructuring local communities to meet the needs of youth. A variety of community demonstration projects aimed at drug abuse prevention are also funded by the U.S. Office of Education and, to a limited extent, by the National Institute of Mental Health.

Research, Development and Evaluation

The recent appropriation of a 20 million dollar fund for development and evaluation of non-narcotic antagonists or substitutes for heroin is a clear example of a national research priority. The pervasive fear that the present administration is unalterably wedded to methadone maintenance

does not appear to be supported by such obvious research priorities on efforts to replace methadone. It will inevitably be the case that substantial portions of this special research fund will go into comparative treatment evaluation studies that could add to our knowledge of existing treatment modalities as well as the new ones based on chemical blocking agents. Although the level of funding for 'basic' research on drug abuse is continuing to increase, federal priorities are shifting toward a greater emphasis on applied studies on the effectiveness of treatment and educational efforts in drug abuse prevention. This trend is limited by the lack of scientific rigor in the majority of applied research proposals.

An Opium Pipe Dream Through a Rose-Tinted Crystal Ball

Even the most optimistic observer of law enforcement efforts to reduce the supply of drugs of abuse must admit that such efforts have not been able to deny these drugs to potential users. The seizure of a small percentage of supplies intended for the illicit consumer has a negligible effect on availability but a substantial effect on price of at least heroin. This increased cost probably encourages the rate at which addicts seek treatment or at least temporary detoxification but it also exaggerates the rate of necessary property crimes to support a more expensive habit. Criminalization of those who possess and use illicit drugs also separates the drug experimenter from alternative sources of "feeling good" through socially acceptable avenues such as school participation, employment, and social interactions with the non-using public. Criminalization of use tends to drive experimenters into dependence upon drugs because such drugs are more dependable than the "straight" alternatives in a society that treats drug use as a crime.

Although there has been some success in controlling demand through increase in availability of treatment and even some dramatic islands of success like the reduction of heroin use among Viet Nam military personnel, these are not adequate to meet the national needs. The point of diminishing returns is reached in any community where the number of addicts in treatment exceeds the availability of employment and other indicators of social acceptance rationed out so sparingly by our society to drug "criminals."

If that analysis is correct and the success rate

of treatment and efforts to halt progression from drug experimentation into dependence reach a disappointingly low-level plateau within the next few months or years, the present administration may be forced to yield to demands for a drastic policy change related to addiction and other drug abuse. The direction of such a change could be in the direction of a reversion to attempts at repression of drug use almost entirely through severe punishment. Punishment will continue to be grossly ineffective unless it can be made as dependable as the perceived subjective "benefits" derived by the drug user. Increased penalties almost invariably result in decreased dependability that such negative consequences will actually be applied.

We may, for the first time since passage of the Harrison Act, be on the verge of serious consideration to a purely public health approach to drugs which would allow civilian application of the early detection techniques employed with great success among military personnel in Viet Nam. Public

health personnel could require clinical examination of urine for evidence of drug usage *only* if drug usage is totally removed from possible criminal action. Quarantine procedures for 'carriers of the contagion' have been seriously proposed and might be implemented under a public health approach as an alternative to imprisonment.

The rapidly changing public mores regarding marihuana use might become the "trigger" for a dramatic shift in overall drug abuse policies. The administration will find it extremely embarrassing when forced into a revision of its policies on that drug unless such a change occurred within the context of a broader policy shift that would relegate the marihuana issue to a minor component of a new national public health policy relating to other drugs as well.

These speculations and views do not necessarily reflect the policies or recommendations of any governmental agency with which the author now is or has been affiliated.

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Behind the Times

[Dr. Winter] had learned his medicine under that obsolete and forgotten system by which a youth was apprenticed to a surgeon, in the days when the study of anatomy was often approached through a violated grave. His views upon his own profession are even more reactionary than his politics. Fifty years have brought him little and deprived him of less. Vaccination was well within the teaching of his youth, though I think he has a secret preference for inoculation. Bleeding he would practice freely but for public opinion. Chloroform he regards as a dangerous innovation, and he always clicks with his tongue when it is mentioned. He has even been known to say vain things about Laennec and to refer to the stethoscope as "a newfangled French toy." He carries one in his hat out of deference to the expectations of his patients; but he is very hard of hearing, so that it makes little difference whether he uses it or not.

He always reads, as a duty, his weekly medical paper, so that he has a general idea as to the advance of modern science. He persists in looking upon it, however, as a huge and rather ludicrous experiment. The germ theory of disease set him chuckling for a long time, and his favourite joke in the sick-room was to say, "Shut the door, or the germs will be getting in." As to the Darwinian theory, it struck him as being the crowning joke of the century. "The children in the nursery and the ancestors in the stable," he would cry, and laugh the tears out of his eyes.

He is so very much behind the day that occasionally, as things move round in their usual circle, he finds himself, to his own bewilderment, in the front of fashion. Dietetic treatment, for example, had been much in vogue in his youth, and he has more practical knowledge of it than anyone whom I have met.*

*Arthur Conan Doyle's short story "Behind the Times," 1894.

The Street Agency

A Response to Need

SUZANNE GEISLER* AND JOHN SIVERSON†

THE PROBLEMS of alienated youth and the growth in the abuse or non-medical use of drugs has become a national concern. Many innovative programs and newly formed agencies have emerged to deal with the so-called "Drug Crisis." Governmental agencies have begun consulting with those involved in handling the problems of contemporary youth, to the point of disregarding the advice of professionals in the helping professions.

This article will explore these new problems and those who have been involved in dealing with them in terms of their historical antecedents, their development, the emergence and evolution of services, their present status and possible future. Implications for the health professional, as well as possible modes of action, will be mentioned.

How It Was

The mass media, through its coverage of Haight-Ashbury's hippie "Summer of Love" in 1967, focused national attention on the new street culture, and its growing illicit drug use. Similar signs of changing life styles soon followed in many American communities including Minnesota.

In the late '60s, young people were developing their own street culture in the West Bank area near the University of Minnesota. It was a decaying low rent area which had already attracted members of the "bohemian culture." The 10 O'Clock Scholar, a coffeehouse known for having once featured folk singer Bob Dylan, was located there. Cafe Extempore, student bars, and several "head shops"—many of which are still operating—rapidly developed.

The West Bank, like Haight-Ashbury, became a repository for unwanted people. Largely inhabited by students and the elderly, the area was rapidly deteriorating. A district long known for its derelicts and alcoholics fast became a haven for their younger counterparts. Hippies, musicians, motorcycle gangs, ex-cons, and runaways gravitated to the community. Suburban youth, when confronted with threatening problems in their home and community also were there. Others came after school and as weekend sightseers to view the "head shops" or scan the long-haired hippies.

The newcomers to the West Bank had much in common. Most felt alienated from the mainstream of society. Some had relatively low coping skills in the traditional culture. Most had low incomes. Many were dreamers and wanderers. Drug use was the main bond, ranging from simple experimentation to recreational use and abuse. As might be expected, illicit drug dealing flourished, nurtured by experimentation with LSD, amphetamines, and marijuana. As with San Francisco's Haight-Ashbury, the patterns of usage in the area progressed from hallucinogens, to amphetamines, to barbiturates, alcohol, and opiates, and finally to combinations of various drugs.

The need for health and mental health care facilities in this area became increasingly manifested due to the lack of self-care and problems relating to increasing drug abuse. Many of the inhabitants were unable to take care of their basic needs such as money, food, and housing. Acute drug crises, initially bad trips and "flashbacks" and then overdose and withdrawal, were handled not by needed medical services but by friends. Longer term problems came in the form of abscesses, serum hepatitis, "burn-outs,"[#] and dependency. Most individuals simply lived with their symptoms, treating themselves with home remedies or illicit drugs, and kept black-market tranquilizers handy when they expected to "freak out."

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The Street Agency is a recent development. Most often it is organized simultaneously in response to an urgent need and staffed primarily by volunteer youth with only a hope and prayer to initially finance the program. While there has been considerable attrition, the street agency seems here to stay.

[‡]Hippie-run shops selling everything from paraphernalia used in smoking marijuana to rock records and incense.

[#]Burn-out—mental and/or physical exhaustion from excessive drug use.

Despite the needs, appropriate help was not available. The young people refused to consult private physicians, who they assumed would overcharge them and hand them over to the law. Neither by training nor experience were medical institutions and their personnel prepared to deal with the new value systems and problems presented by alienated youth. In some instances, bad feelings were reinforced towards institutions in general by turning away individuals exhibiting overdoses and other associated problems. It was not uncommon to hear drug abusers claim mistreatment by helping agencies because of the negative attitudes displayed toward them. Given the strong attitudes many individuals in our society hold about certain types of drug-taking, such emotional responses are not surprising. A Canadian commission of Inquiry on the Non Medical Use of Drugs commented that physicians and hospital staff often lacked patience, and sometimes "... expressed hostility towards the drug user." Numerous examples of similar occurrences in this area and elsewhere in the United States have been reported.

Emergence—The Initial Response

While some physicians and others in the health professions responded in other areas of the city* the response to the West Bank difficulties was negligible. Dr. Judy Bergfalk† singlehandedly responded to the medical and emotional crises of the West Bank community with never-tiring patience and compassion. She often operated out of Sister Rita's Free Store where used clothes, appliances, books, and other items, were available free. Both old and young took advantage of the Free Store. She would treat suburban youth who were reluctant to consult their family physicians for fear of parental involvement. The law requiring parental consent to treat minors complicated the situation for both the physician and youth

*Teen-Age Medical Service, started by pediatricians connected with the Children's Health Center, opened in the fall of 1968, becoming one of the nation's first free clinics. In June, 1969, a group of mental health professionals founded Walk-In Counseling Center, a free no-red-tape crisis center. Both services are still active and functioning in south Minneapolis.

†Dr. Bergfalk—a pediatrician known to West Bank people as Dr. Judy.

‡Crash Pad—an apartment or house where an individual who has no place to sleep or pass out from drugs may remain overnight or a few days.

#Street Professional—For purpose of this paper, a "street professional" implies that an individual who, by experience and informal training had attained a significant level of competence to deal effectively with alienated persons and their difficulties.

seeking medical help. Fortunately the law has been changed.

Crash pads‡ were common on the West Bank. Eventually some became more organized and provided more than just a bed for the night. One example was the Agape House, a temporary home for runaways and outcasts which combined counseling with housing.

The Midwest's first hot-line service, Youth Emergency Service, known as Y.E.S., was organized in May, 1969.

Y.E.S. ushered in a movement seeking to respond to the critical needs of the youth culture by using knowledgeable street people to help their peers. Not only did the phone service demonstrate to the established organizations where they had been failing to respond, but it indicated how they might change and help. Y.E.S. also recruited and developed many "street professionals."#

Through experiences at Y.E.S. many volunteers became aware of needs not being met by existing agencies. Several went on from Y.E.S. to initiate new programs.

One program started by former Y.E.S. volunteers was the Pharm House, a drug crisis intervention center founded in the Spring of 1970. With the exception of methadone programs for heroin addicts and alcohol treatment programs, there was no place for a person with drug related problems to receive counseling. The Pharm House, like many other youth programs which followed, began on an experimental basis. During the summer of 1970, Pharm House carried on research to determine the extent of drug usage and the need for a treatment program. At the same time it provided emergency drug care, therapeutic discussion groups for people trying to get off drugs, and a community drug education program.

The Pharm House also initiated Minnesota's first youth-oriented residential drug treatment program, which was operated by youth. An outpatient program for drug-dependent youth and their parents was also begun.

The impact of the Pharm House and other new programs upon the West Bank community and greater metropolitan areas reinforced that of Youth Emergency Service. Most were volunteer organizations run by "street professionals." They were confronting the established institutions for their lack of responsiveness to youth. Their primary philosophies were based on the belief that peers

could help peers, and that people were entitled to proper physical and mental health care. Just as many youth-oriented programs were born out of Y.E.S. volunteers, so were many drug related programs developed by former Pharm House staff. Many new services followed. Drop-In Centers,* new phone services, draft counseling centers, etc. sprang up in 1970. Subsequently, other treatment facilities provided viable alternatives to chemically dependent persons in the metropolitan area.

The Present Status

In May, 1972 rules and regulations being proposed by the Department of Public Welfare for implementation of a licensure law threatened every program, person, and organization working with chemically dependent people, by “. . . prohibiting the operation of such facilities and services without a license; providing penalties . . .”†

These changes could potentially threaten agencies to the point of their very existence. For the first time, the established or “straight” and “street” agencies realized their need for each other.

In response to this threat, a meeting was arranged to bring together representatives of all concerned agencies active with alienated youth. Today, as a result of this effort as well as others, there is growing cooperation and coordination among agencies through a new organization, the Drug Assembly.

Since its inception the Drug Assembly has defined several goals. One impact of such a unified yet independent voice is a totally new concept of licensure. The proposed rules and regulations for licensure as rewritten are supportive of innovation and the use of “street professionals,” and will, if adopted rely more on evaluation and suggestion than censure and recriminations.

Another goal is ultimately to provide smoother continuity of care for those who rely upon drug-related services. A Drug Assembly Funding Task Force will soon present a grant proposal to the Narcotics Addict Rehabilitation Branch of National Institute of Mental Health for the funding of many agencies within a system which empha-

sizes evaluation and follow-up. It is hoped that with such cooperation, fewer people with drug problems will be “lost” between agencies.

The continuum of care concept is being reinforced by a task force concerned with the lack of detoxification services for the drug dependent in Hennepin County. It is presently arranging a volunteer service to assist the Emergency Room hospital staffs to identify the chemically dependent person and to suggest appropriate referrals.

A communications network has been established. All relevant information developed by the Drug Assembly is passed to individuals and agencies via this communication channel.

In addition to Minnesota being one of the most advanced states in the country in terms of its drug services, it also is the home of the *Exchange*, a national newsletter for hot-lines and other youth-serving agencies. The Third International Hotline Conference was held last year in Minnesota. Less clearly related to drugs, yet important to the problems of alienated youth was the National Run-away Conference held in Northfield, Minnesota in the summer of 1972.

In May, 1972, when the Office of Youth and Student Affairs of the Department of Health, Education and Welfare, selected four people to discuss youth crisis centers with Mr. Elliot Richardson, then its Secretary, two were from Minneapolis.

Future

As agencies multiply and cooperation continues, the complexion of “street agencies” will change. The original experimentation and “fly by the seat of your pants” attitude will be replaced by the increasing proficiency of the “street professional.” Established health and social service agencies will absorb some of the more experienced to the mutual advantage of all concerned. Finally, enriched training programs for the street agencies personnel and changes in the established “straight” agencies will result in increased effectiveness in service offerings to those in need.

Since the initial panic about the drug “crisis” is beginning to subside. It is now appropriate to define more critically needs and to develop appropriate methods of providing for the solutions. Prevention requires attention as does recognition that self-destructive drug abusers often are the symptom-bearers for others—their family, schools.

*Drop-In Center—Community oriented programs providing an informal and non-threatening place for youth to relax and receive counseling.

†Quoted from An Act, Chapter No. 627.

or perhaps the culture itself.

Implications for Health Professionals

There is, more than ever before, a need for increased cooperation among drug related and health care services. Cross-referral for many types of problems seems appropriate for both the institution and the client. Now that more alternatives exist, each group must take stock and decide what it can do best to serve its clientele. All must share the responsibility for defining unmet needs and developing services to meet them. Finally, it is crucial that a continuum of care concept be implemented in the areas of health, mental health, and drug abuse treatment and prevention which

span "street" and "straight" agencies, "street" and "traditional" professionals. It is the mutual responsibility of all to educate and direct those in need to the appropriate resources as well as to be informed themselves about these same matters. Street agencies must begin to provide more referrals for medical needs, and all health personnel must utilize to advantage the consultation currently available from street professionals and street agencies. Through getting to know each other better, a realistic mutual awareness of limitations and sharing of skills and expertise in these areas will emerge hopefully to the enrichment of all.

Cannabis

We should note that cannabis has in the past been a legitimate medicine in America. Why not now? Was it shown to be dangerous? No: it is astonishingly safe with a lethal dose in dogs or monkeys hundreds to thousands of times its "effective" dose. Did physicians decide, for some medical reason or reasons, that it should no longer be available for use? By no means: it was removed from the United States Pharmacopoeia and the National Formulary following passage in 1937 of the Marijuana Tax Act, against which legislation the American Medical Association spoke out vigorously through its representative, Dr. William C. Woodward. Doctor Woodward, who was a lawyer as well as a physician, was at that time Director of the Bureau of Legal Medicine and Legislation of the American Medical Association, and he pointed out to the Ways and Means Committee of the House of Representatives that cannabis should remain available to physicians for study and for appropriate use. Incidentally, with its safety, its lack of physical addictiveness and its remarkable freedom from developed tolerance in the user, it is a drug with exciting possibilities for geriatrics. It is a mild mood-elevator and an exceptional appetite stimulator, virtually free of recognized adverse effects.

How, then, has it happened that American physicians have so quietly given up the availability of this drug to the demands of government? Why have we rejected the judgment of sound medical scientists and rallied around the grossly unscientific, largely anecdotal arguments of the old Federal Bureau of Narcotics? How did we come to our current position concerning marijuana? Has our position complicated society's "pot" problem?

Perhaps we should inquire into these questions. If so, we will likely read the article by Allentuck and Bowman printed in the *American Journal of Psychiatry* in 1942, and which ends with the following paragraph:

"There is no evidence to suggest that the continued use of marihuana is a stepping-stone to the use of opiates. Prolonged use of the drug does not lead to physical, mental or moral degeneration, nor have we observed any permanent deleterious effects from its continued use. Quite the contrary, marihuana and its derivatives and allied synthetics have potentially valuable therapeutic applications which merit future investigation."

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Marihuana

What Type of Problem

S. B. SPARBER, Ph.D.*

MARIHUANA officially currently has no therapeutic uses in this country but unofficially is being used by upwards of 20 or more million individuals to self-medicate themselves. This statement may be enough to rouse the profession against the legalization or the decriminalization of marihuana, if only to keep the prerogative of use of pharmacologically active agents within the purview of the licensed physician. However, aside from the fact that other medicaments, in the form of lower dose over-the-counter preparations and other "mind-altering drugs" such as alcohol, are being used by an even larger segment of society, it may turn out that the marihuana "problem" is not a pharmacological-medical one but rather a socio-legal one.

After having searched (perhaps in vain) for clearcut evidence that marihuana or its active constituents, produce untoward effects upon the human body, the biomedical evidence may have to bow to population pressures, as does the tobacco problem. Most enforcement agencies are willing to concede that the law, at least for possession and use, is unenforceable within the framework of the total population. As a result, there often is prejudicial or selective enforcement. The figures published by the U.S. government indicate approximately 10-15% of the population has used marihuana. This being the case, just about every reader of this article should know or have contact with an occasional or regular marihuana user.

Indeed, if one can rely upon questionnaire information, among four medical schools surveyed, "use" figures range from 16%-70% having tried marihuana to nearly 50% currently using the drug.

What makes the "problem" even more exasperating is the traditional reliance of legislative bodies upon organized medicine for at least partial guid-

ance in matters of this type while a view of the official stance of organized medicine (AMA) on marihuana through the last 35 years or so suggests very strongly that political expediency may have severely suppressed objectivity on this issue. An excellent treatise on the legal ramifications of the problem is Kaplan's book *The New Prohibition*.

Source or Botanical Origin

Most of the marihuana used in this country is used in cigarettes and consists of various parts of the plant *Cannabis sativa*, of which there are many varieties. Certain parts of the plant are not included in the legal description, since these parts are used in the manufacture of hemp twine or in making oil or cake from its seeds. Nevertheless, it would not be surprising if these excluded parts, from certain varieties of cannabis that have a high yield of the apparent active principle(s), contain more of the active principle(s) than included parts from the typical so-called Minnesota-green variety. Therefore, any discussion of marihuana must take into account the content of the major active constituent (Δ^9 -tetrahydrocannabinol, THC^{\dagger}) as well as various other factors to be discussed later.

Toxicity

From preclinical infrahuman, as well as several clinical observations, it is apparent that the margin of safety with cannabis and its synthetic active constituent, THC, is extremely high. Translated into pharmacological language, the "therapeutic" ratio ($\text{LD}_{50}/\text{ED}_{50}$) for man has not been determined, since there are no known deaths directly attributable to marihuana. In animals, the dose for various behavioral actions ranges from fractions of a milligram/kg to upwards of 10-20 mg/kg of THC, depending upon the sensitivity of the measure and the species. The parenteral doses of this compound (THC) necessary to produce death in some species is in the 200-500 mg/kg range acutely, with some animals participating in chronic tolerance studies surviving and

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$\dagger \Delta^9$ and Δ^1 are synonymous, depending upon which nomenclature is being used.

active at doses as high as 1800 mg/kg, showing little or no signs of withdrawal syndrome characteristic of opiate or barbiturate dependence. Higher species (dog, monkey) appear even less sensitive to lethal actions of THC than rodents. To get some perspective regarding this measure of toxicity, the therapeutic ratio for morphine (acutely) in man is on the order of five to 10. In the case of digitoxin, using toxic effects (vomiting) rather than death and ventricular slowing as the therapeutic effect, the median toxic dose has been estimated at about 30 micrograms/kg, p.o. while the median therapeutic dose was estimated at about 10 micrograms/kg, p.o. as a single dose. The above comparison is not to be construed as suggesting that cannabis or THC is pharmacologically inactive. The drug is indeed active and as shall be discussed later, its activity may lead to its use or use of synthetic congeners of THC in several specialties and subspecialties of medicine, including psychiatry and ophthalmology.

Physiological Effects

The most widely known and reliably reproduced physiologic effects of marihuana are the slight tachycardia and conjunctival injection. The reddening of eyes does not seem to be the result of irritation by smoke, since it is also produced by the orally administered compound. A more recent observation, which may lead to the compound's use in the treatment of glaucoma, is a reduction of intraocular pressure by an average of 25% in 11 subjects studied.

Although reports of enhanced appetite and desire for sweets has partially been confirmed in a laboratory setting, there is no evidence that this is brought about by alterations in blood glucose levels. Either decreased responsiveness of the glucose receptors in the central nervous system (CNS) and/or increased sociability, with our traditional proclivity towards sharing food, may be responsible for this mild effect.

Central Nervous System

Studies with radioactive THC given to monkeys have demonstrated a correlation between peak behavioral effects of the drug or metabolites and their regional distribution to limbic system structures and other areas thought to be involved in recent memory consolidation (hippocampus, amygdala), sensory perception (corpus quadrigeminum), and coordination (cerebellum). It may

turn out that the major effects of marihuana on CNS function are a reflection of its (or its metabolite) physical-chemical properties like lipid solubility, etc. and therefore its disposition within the body.

Neurochemistry

There has been a major thrust of research on the importance of the biogenic monoamines, such as acetyl choline, dopamine, norepinephrine and serotonin, and their involvement in brain function in recent years. It is therefore not surprising that studies on the effects of THC upon these transmitter compounds have been undertaken in recent years. Some studies purport to have demonstrated changes in steady state levels of some of these monoamines. Others report changes in turnover or synthesis of the compounds. Most of the neurochemical studies have been performed with extremely high doses of THC; certainly well above the behaviorally active doses for the respective species involved. It is therefore too soon to draw any conclusions as to the involvement of compounds like serotonin, which has been fairly well identified as being involved in some of the actions of lysergic acid diethylamide (LSD) and other hallucinogens, or the catecholamines, implicated in the mechanism of action of amphetamine-like drugs. There have recently appeared some reports suggesting an effect upon dopamine function, the transmitter system apparently involved in disorders such as Parkinsonism, Huntington's Chorea, and Gilles de la Tourettes' disease.

Behavioral-Psychological Effects

In animals, behavioral effects attributable to marihuana or THC range from facilitation or enhanced performance of some types of conditioned behavior to disruption or prevention of other types of behavior. Studies using more precise measures, such as operant timing behavior by monkeys, pigeons and other species, show effects at low doses that are consistent with those reported for man. Where requirements are such that the organism must delay its responding for an arbitrary period of time, more often than not, there is an overestimation of elapsed time resulting in premature responding. One of the most profound effects of THC in man is the stretching of time estimates, minutes seeming like hours, etc.

Several reports on interaction of THC with other drugs suggest pharmacodynamic, as well as

metabolic, interaction. Initial studies in animals showed enhanced barbiturate induced sleeping on the one hand as well as enhanced amphetamine induced increases in locomotor activity on the other. Various other reports in the literature further support an interaction between THC and other psychoactive drugs and it is the general consensus that THC has both stimulatory and depressant activity; either dose dependent or related to the fact that THC may be both a pharmacologically active agent in addition to being a prodrug (to be discussed along with its metabolism).

In humans, perhaps because of the rapidity of its onset of action when smoked, and many of the cues or stimuli associated with the effects of the drug, there appears to be an inordinately large learning component associated with the subjectively reported effects. Translated into clinical therapeutic terms, the "placebo" effect, especially in experienced users, is great; for example, in one carefully controlled experiment experienced marihuana users were not able to differentiate between potent cigarettes and cigarettes containing little or no THC but still smelling somewhat like the "real thing." The phenomenon of sensitization or "reverse tolerance" appears real enough in the initiate and casual user but tolerance also appears to develop in the more avid user, although as mentioned previously, withdrawal or abstinence symptoms are minimum and are similar to those of other compounds which are inducers of mild to moderate psychological dependence, not unlike tobacco.

The "reverse tolerance" is probably due to the fact that the initiate doesn't know how to perform the mechanics of deep inhalation necessary to get the greatest absorption and subsequently learns this, resulting in greater availability of THC per puff or cigarette. In addition, never having experienced the subjective, psychological effects, he does not know what to expect or look for at first (expectation). With repeated exposure, this expectation comes to play an important role in the experience, as does the nature of the environment, both social and physical. The third apparent reason for the reports of sensitization is the long half-life of THC in the body. It has been estimated that the plasma $t_{1/2}$ (time necessary for initial plasma levels to diminish by $1/2$) in naive individuals is approximately 56 hours. This means that 56 hours after the initial dose or exposure,

there is about 50% of the THC or metabolites (some of which may also be active) still in the plasma. If the user smokes another cigarette of equal potency one or two days later, he or she requires fewer puffs or cigarettes, to reach threshold or active plasma and presumably brain levels, everything else being equal.

Chronic marihuana use however, conveys a sort of tolerance to this effect in that the plasma $t_{1/2}$ now decreases to approximately 28 hours. These observations suggest an enhanced metabolism and/or excretion rate as a result of greater use.

Metabolism

The above observations, coupled with concurrent studies in animals, have led to the conclusion that the enzyme system (normally studied in liver but identified to be active in lung and other tissues associated with organs or tissue involved in protective or toxicological degradative mechanisms) responsible for ridding the body of no longer usable steroid hormones and many other types of drugs, through oxidation or reduction-type metabolism, may be alterable by THC and play a role in its action.

It has been known for many years that these microsomal mixed-function oxidases (enzymes) can modify drugs or other lipid soluble active chemicals to more water soluble, usually less active compounds, which are then more easily excreted in urine or feces. In addition, prolonged exposure to some of these drugs can cause an increase in the amount of enzymes available for metabolizing themselves and other compounds. Before this induction (increased capacity) effect is realized however, there may be competition between two or more substances that are metabolized by these mixed function oxidases and therefore result in slower or less metabolism of either or both. This phenomenon could account for enhanced or prolonged drug effects resulting in what I previously referred to as metabolic interaction. An important clinical example of metabolic interaction after induction has taken place can be seen in an enhanced effect of dicumarol (longer prothrombin time) after a patient is taken off a barbiturate (phenobarbital is a potent inducer) that he or she has been receiving along with the anticoagulant. Since the anticoagulant is metabolized more rapidly, due to induction of the enzymes by the barbiturate, when present, more of the antico-

agulant is needed to maintain an adequate prothrombin time. In the absence of the inducer, the rate of metabolism of dicumarol decreases, resulting in an *actual* increase in dose. In the case of marihuana or THC, it appears that enzymes modify the structure of THC to 11-OH- Δ^9 -THC and then to 8,11-diOH- Δ^9 -THC. The first step seems to be relatively rapid and studies in animals and more recently in man, indicate that the 11-OH- Δ^9 -THC is at least as active or more active than the parent compound. This means that 11-OH- Δ^9 -THC and the parent compound are

active, perhaps even in different directions, one being responsible for the stimulant effects often reported, the other, for the later depressant actions.

So we have a compound which itself may be potent pharmacologically as well as being a pro-drug for another potent compound, its metabolite. There are other metabolites besides the di-OH-THC and more research is needed to determine whether or not they are active. Most appear at this time to be less active or inactive.

Drugs and Early Man

Drugs have made up a fascinating portion of man's ecosystem since prehistoric times. Ancient accounts of drug use, full of fantasy, superstition, and credulity, abound in the writings of Homer and other venerable authors as well as in the unwritten traditions of primitive societies. Most of these substances were readily obtained from plants found in the immediate environment, their properties discovered by unknown individuals and under circumstances long since forgotten. Their use was perpetuated through the centuries by demonstration and by word of mouth, a part of the cultural lore by which ancient man attempted to cure his ills, alter his conception of reality, or destroy his enemies.

The systematic study of plants and drugs began with the Greeks in the era of Hippocrates and reached its classical apogee in the works of Dioscorides, a Greek physician in the Roman army of the Emperor Nero. The *Materia Medica* of Dioscorides was an exhaustive collection of short illustrated accounts of plants and their practical uses, the sum of the time's knowledge of drugs, and one of the most influential botanical treatises ever produced.

The earliest and the finest of the Greek herbals still in existence is a brilliantly illustrated volume of Dioscorides prepared about 512 A.D. as a wedding gift for the daughter of a Roman Emperor. One of the pages from that manuscript, depicts the mandrake root, thought to grow in the shape of a man's body, together with a dead dog which has been sacrificed in the ritual digging of the root. Mandrake was an early source of hyoscine or scopolamine.

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Charles Singer's *Early Herbals*, written in the 1920's and reprinted by Dover Publications in 1958 as one in a collection of his essays entitled: *From Magic to Science*.

Perspectives on the Drug Problem

ROBERT G. B. BJORNSON, M.D.*

EARLY IN THE 1960s, an interviewer was trying to get Ernest Hemingway to identify some essential qualities or characteristics or abilities of a "great writer." As the interviewer listed various possibilities, Hemingway disparaged each. Frustrated, the interviewer finally asked if there was no single, essential ingredient Hemingway could identify. "Yes, there is," Hemingway replied. "A person must have a built-in, shockproof crap detector." Writers are not unique in that need. Such a device should be particularly helpful in gaining and preserving worthwhile perspectives on the drug problem and, if they are indeed separate from the problem itself, on our societal responses to it. Andrew Weil has recently written that "I cannot help feeling that what we are now doing in the name of stopping the drug problem is the drug problem."¹ It is not, of course, quite that simple. Even the grammar is deceiving: the "drug problem" is grammatically singular, but it must be plural in understanding. And one of the many problems within "the problem" seems to be that we have failed to ask ourselves the right questions. It is not only that many of our answers have been wrong, but some of our questions have been wrong. And this has involved our failure to challenge or examine the assumptions upon which we have proceeded to "attack the problem." Let's consider some of them.

One clearly incorrect assumption is that psychoactive drug use is statistically deviant behaviour. We have assumed that such drug use is a minority phenomenon, while it is in fact a majority phenomenon. Statistically, the deviant person is the non-user, not the user. Perhaps, as John Brantner has smilingly suggested, we should be asking not why a person *uses* drugs but why a person does *not* use drugs. Contributing to this misconception has been the broad societal failure, or unwillingness, to recognize alcohol, nicotine and caffeine as

psychoactive drugs, and unfortunately we physicians haven't been as helpful here as we might (and, I think, should) have been. For example, even we at times say or write "alcoholism and drug abuse" rather than "alcoholism and *other* drug abuse." While to some this point may seem insignificant, it contributes to a fundamental misunderstanding. For it facilitates our viewing "the drug problem" as involving another part of society than our own, and it allows the parent who holds a martini in one hand and a cigarette in the other to berate with clear conscience his son or daughter for smoking pot. To be sure, there are legal differences, and serious ones. But those legal differences not only further the misunderstanding but have in part issued from misunderstanding.

Another invalid assumption is that drugs can be made to "go away." This idea underlies attempts to seal off borders, to eradicate wild hemp and to induce foreign governments—even perhaps by offering them substantial payoffs—to prevent the growth of opium poppies. When such efforts fail, as they thus far have failed, we simply redouble our efforts. How can we really believe, in a society caught up, as ours is, in the concept of "better living through chemistry," that we can eliminate attractive mind-altering drugs? If, as alleged, a 14-year-old boy in San Francisco was able to make methamphetamine in his bathroom or his basement, is it reasonable to expect that we can *eliminate* such drugs? What in our experience suggests that we can do that? Were we, during the years of the Volstead Act, able to eliminate alcohol? Or control it? Why, then, do we now think we can do so much better with large and growing numbers of substances, including many made in the laboratory?

A similarly-unrealistic assumption is that people who want to use drugs can be effectively discouraged from using them. Andrew Weil characterizes this idea as an impossible dream that gets us nowhere except into worse trouble.² Involved here is the absurd and pragmatically malignant assump-

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tion that what we need in controlling drug use is increased repressiveness, in the form of what Abraham Kaplan, professor of philosophy at the University of Michigan, has called "the savagery—I know no more appropriate word—of the punishments which are inflicted, or urged to be inflicted, even for what could scarcely be objectively characterized as an *abuse* of some of the drugs."³ This repressiveness is exercised primarily through laws and law enforcement, based on the rather broad societal assumption that the law is an appropriate mechanism for dealing with largely moral questions. Arthur Miller, in his fine play "The Crucible," wrote of the days of the Salem witchcraft trials, which issued in the hanging deaths of nineteen persons and the crushing to death of a twentieth. Those things were accomplished by the duly constituted authorities and with the avid support of most of the citizenry. The relevance now of our horrified reaction to that play seems obvious, and worth pondering.

A related idea is that the very drug problem itself results from excessive parental and/or societal permissiveness. Within the past three months a colleague expressed this idea to me with fervor. He had been the prior night to a meeting on drug abuse, where the main speaker had been the local chief of police. The chief had brought along some drug samples and some scare-tactic literature and a scare-tactic movie, and my physician acquaintance had come away convinced somehow that, as he expressed it to me, "the whole damned trouble is that there is too much permissiveness in the home." He obviously didn't mean that literally, for he went on to point out the need also for laws with teeth and for a tough, vigilant police force, and for staunch, implacable judges. But let philosopher Kaplan speak to this matter of permissiveness:

"What I find particularly distressing about this myth of 'permissiveness' is both its failure to recognize the basic values of freedom in our society of individuality, and also the underlying assumption of an innate depravity in the young, as though if we give them permission to live as they choose, they will inevitably choose to be damned. I think that one could very reasonably say that young people today are not ready to exercise freedom; but I believe also that one could reasonably say, neither is anybody else. None of us is wholly ready either for freedom or for responsibility.

"The social problem, in my opinion, does not stem from our failure to be more repressive. It lies, rather, in the absoluteness, and I would say

also in the emptiness and the dishonesty, of so many of the norms that society imposes on the individual. I have elsewhere had occasion to characterize American morality as, from many standpoints, a tyranny tempered by hypocrisy. What many people perceive as a repudiation of morality is instead a repudiation of the hypocrisy."⁴

Another invalid, and particularly naive, assumption is that the heroin problem is largely a matter of moral depravity in the users, that basically it is somehow a failure of the home and the Sunday school and the church to teach them well the appropriate moral lessons. Heroin is extremely big business, enormously profitable and providing powerful financial motivations. Incidentally, we should keep in mind also the big business aspects of legal mind-altering drugs. But back to heroin: part of the financial motivation is toward the paying-off of authorities. But there is much more to it than that. Heroin yields huge profits, somewhat independently of its street price. That price follows the law of supply and demand: when, whatever the reason, the supply goes down, price goes up. The higher the price to the consumer, the greater his need to support his habit through, for example, burglary and shoplifting. When heroin prices go up, those crime rates go up. Shoplifting, of course, requires a complicitous public. Millions of dollars' worth of merchandise is shoplifted annually, and this must be sold through "fences" back into society. Some of the shoplifting losses are covered by insurance, which lessens management's distress. And society seems more than ready to buy up the "hot" merchandise. All manner of things are available, and many people actually place orders for what they want. Mothers on welfare may clothe their families for winter, as may elderly persons on Social Security. Traffic in stolen goods "represents a broad avenue through which merchandise flows down the affluent society into the indigent strata. This 'Secret Domestic Marshall Plan' is perhaps one of the more successful and less well advertised poverty programs of the Great Society."⁵ So there are many who profit from the heroin traffic, and preoccupation with the "moral depravity" of the user seems patently simplistic. "Is it possible that, like another war more familiar to us all, the war against addiction is perpetuated even while it fails because of hidden economic interests which benefit from its continuance?"⁶ It is worth noting here that legalization of cannabis has good reason to be unpopular with

heroin traffickers. With cannabis illegal, the cannabis buyer can be rather safely solicited by the heroin seller: no one is likely to complain to the police that he was offered one illicit substance while he was trying to buy another! So cannabis users, currently outside the law, make up a promising "prospect list" for heroin sellers. This illegality-in-common underlies the misapprehension that "marijuana leads to heroin." Society, in choosing to criminalize the cannabis user, has itself facilitated the association of these substances—just one example of how society's responses to drugs have in fact contributed to the developing drug problem.

Also meriting scrutiny is the assumption that the solution to the drug problem lies in putting more stress on, and more money into, our programs of drug abuse education. Drug education in America has itself become big business. It has, as pointed out by Peter Hammond, Executive Director of the National Coordinating Council on Drug Education, in an address last year to the 30th International Congress on Alcoholism and Drug Dependence in Amsterdam, captured the imagination of presidents, legislators, bureaucrats, school boards, publishers, film producers and gadget makers. Huge sums have been allocated to it, and tens of thousands of people have developed significant personal and financial interest in continuance of the drug problem. It seems they needn't worry: as Hammond explained in Amsterdam, drug abuse education in America seems to be failing, and failing miserably.⁷ Fundamental to that failure has been a lamentable lack of concern with a basic question about drug education: "Toward what improved human condition should drug education lead?" A common assumption is that drug education should lead to a drug-free state and that complete success of a drug education program would mean the achievement of that state. While that assumption is conceivably valid in the abstract, it is wholly impractical: recorded history includes no society, with the possible exception of the Eskimo, free from the use of psychoactive substances. Even if it be true that the best possible use of such substances is the least possible use, should we not in our drug education programs be pragmatically aiming toward the best achievable pattern of societal drug-avoiding or drug-using conduct? And what might that best achievable pattern be? Is it not possible that we should be aiming with our drug education at the goal of dis-

crimination in both the avoidance and use of drugs—intelligent, well-informed, carefully-considered discrimination?

One of the most serious and most significant assumptions of all is that, within the framework of personal freedoms to which this country is fundamentally dedicated, forcible control of societally non-threatening actions of our citizens is desirable. In his great essay "On Liberty," John Stuart Mill made what is to me a convincing case against governmental interference with personal liberty when exercise of such liberty does not threaten others. I recognize, of course, the problems in separating the self-regarding from the other-regarding issues of various personal acts and the need for knowledge and reasoned judgment. Our Constitution and Bill of Rights protect, or seek to protect, freedoms which may be incompatible with forcible elimination of drug abuse. E. Leong Way, professor of pharmacology at the University of California in San Francisco, has pointed out that the Peoples Republic of China seems to have no serious problem with drug abuse.⁸ There indeed seems little likelihood that any totalitarian and sufficiently-ruthless state would have serious trouble with any form of social deviance, drug-related or other. Any person even suspected of deviant behaviour—and "deviant" would be defined by the state—would be eliminated. But is drug abuse control by law really a viable and acceptable possibility in the United States of America, where we might ultimately pay for such control with the irreparable loss of personal freedoms which uniquely characterize the American dream? We should soberly consider this.

An assumption rather frequently made by physicians is that the whole matter of drug abuse is a societal problem and is really not properly the province of the physician, who should concern himself with his sick patients and leave the broad social problems to the social scientists. While this view is to a degree understandable, it is not really defensible. It was (and this was initially a surprise to the author) Rudolf Virchow who said: "Medicine is a social science in its very bone and marrow . . ."⁹ And Abraham Kaplan, in answering a question from the audience following an address to the 1970 International Conference on Drug Abuse at the University of Michigan, said in part:

"In the history of medicine, as seen, at any rate, from the standpoint of the philosophy of science, we moved from a period in which disease was

thought to be localized in particular tissues or organs to a period in which we recognized the illness of the whole organism, then beyond that to the notion—a very proper notion, in my opinion—that certain disturbances require family therapy. I am now saying that awareness of the health or disease of a whole community is what is here called for. The proper question is no longer, 'What's wrong with that particular person?' or 'What's wrong with me that I let him go wrong?' but rather, 'What is wrong in this community, in which such and such segments of it try to cope with their problems in this particular way?'¹⁰

The physician who extends his concern, and his practiced skills, from individual patients to the total community and thus becomes a public health

agent, does not lose his physician identity. Nor does the physician who involves himself with social and economic and political forces with an impact on health. What, after all, determines the identity of the physician? Certainly not technique: what, for example, have the techniques of neurosurgery, radiology and psychotherapy in common? The fundamental determinant of physician identity is a sense of responsibility and responsiveness in the presence of anxiety and pain and helplessness—a clinical conscience, as Matthew Dumont has written.¹² That clinical conscience, acting in response to serious societal sickness, is sorely needed now.

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Narcotic Withdrawal Syndrome in the Newborn.

Maternal narcotic addiction may result in narcotic deprivation syndrome in the newborn. Pettey described six cases in 1912; at least 51 additional cases have since been reported (Schneck).

Several observers have reported that prematurity is a frequent complication of heroin addiction. Of 18 heroin addicts in one series of cases nine gave birth to premature infants (Schneck). Clinical manifestations of narcotic withdrawal in the newborn include a high-pitched, continuous, piercing cry, neuromuscular hyperexcitability with coarse tremors and twitching of the face and extremities, increased deep tendon reflexes, incomplete Moro reflex, and in severe cases, repeated generalized convulsions. Anorexia, vomiting, and weight loss are present in some instances. Respiratory failure is a likely fatal danger. The severity of withdrawal reactions relates to the quantity, consistency, and duration of narcotic use by the mother, as well as to the period of time from the last dose of narcotic prior to the birth of the child.

Mild cases improve spontaneously after five or six days. Severe cases require treatment with gradually diminishing doses of opiates, barbiturates, or tranquilizers until neuromuscular symptoms subside and the danger from respiratory failure has passed. Whether the addiction causes permanent deleterious effects upon brain cells or foreshadows hereditary emotional instability or psychic defects is not known.

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Treatment of Chemical Dependency of the Morphine Type

Pharmacological Strategies

ROBERT A. MASLANSKY, M.D.

IN MINNESOTA SINCE June of 1968 four clinics and a number of satellite units licensed by the FDA have been using methadone HCl as the main pharmacological treatment for chemical dependency of the morphine type. Approximately 400 patients were taking the drug as of November 1, 1972. What part of the opiate dependent population this represents is not accurately known. However there is data suggesting this represents 20% of the group of potential candidates for treatment.

Methadone is used in the following ways: (1) A single dose given to an acutely ill addict with the clinical diagnosis of acute opiate abstinence syndrome. Generally 20 mg. of methadone is sufficient to ablate both subjective and objective manifestations of the acute illness for five hours. The rationale for this approach is that it is humane, and provides an entry point for a patient for more definitive treatment (from here a referral to a treatment center can be made). (2) For acute short term detoxification. One of several circumstances may dictate this form of therapy: (a) A sincere request on the part of a patient to be relatively painlessly withdrawn from his habit, (b) In anticipation of incarceration where abrupt discontinuance may cause more severe illness, (c) A manipulative device to tide a patient over while his supply of cash or drugs is nil, (d) A manipulative device to secure greater sympathy from the courts if a sentence is pending. The schedule used is: 20 mg. daily for three days, 10 mg. for two days, five mg. for two days then placebo for four days. (3) For long term detoxification; theoretically all patients in a maintenance program will undertake detoxification at some point in their treatment. However, a number of stabilized well-adjusted methadone patients whose social rehabilitation has been complete choose to defer the decision to detoxify, arguing that they are doing so well that to "rock the boat now" would be pointless and dangerous. When a patient sincerely desires to become drug free the schedule is ordinarily a 10 mg. decrement in total dose per week with the last week of five mg. per day and finally

a week of placebo.

The disease model for the complex sociopsychophysiologic disorder, chemical dependency of the opiate type has modest utility only. Therefore a pharmacologic strategem, quite appropriately, must be suspect. It should be clear that detoxification schedules, maintenance schedules and dosage adjustments are only a small part of the total approach to the patient.

The decision to use a drug that shares with heroin most of the effect altering properties, certainly the dependency and tolerance liabilities, must be justified in a special way. It is not wholly satisfactory to equate maintenance therapy with methadone to maintenance therapy with insulin, digitalis or even psychoactive substances such as the tranquilizers. Opiate addiction is a chronic disorder and as in treatment for all chronic and unending diseases, several goals are sought.

The basic problem that must be met is pathologic dependency. Dependency states, both chronic and intermittent, are part of the human condition. Dependencies of varying severity are universal.

There comes a point in time when chronic overeating, cigarette smoking, alcohol consumption, cannabis use, sleeping pill and tranquilizer use become patently self-destructive.

In the case of the opiates because of their pharmacologic properties, acute physiologic dependency is rapidly acquired and use is reinforced by profound environmental and endogenous reasons.

Methadone treatment has another dimension. It serves as a microcosm for some of the social issues of our day. The right of an individual to do to himself what he chooses is in tension with the right of the state to interrupt individual action as it becomes a threat to others. Can one find the "right" time to intercept freedom? The matter of mandating a therapeutic adventure is not often an issue in clinical medicine. The only analogue may be in contagious disease. However, we do mandate social measures in the criminal justice process. Is methadone treatment then in a sense

a social manipulative devise? And another; it is possible to amputate breasts and legs, apply highly toxic and symptom producing medicine, invade patients with tubes and devices out of all human dignity. The application of continuous methadone therapy implies the same intellectual conflict. Basically it is the conflict between what is practicable and applicable and what is an ideal therapy.

While the methadone polemic proceeds other pharmacologic strategies are being developed. The use of a longer acting methadone like drug alpha methyldol having a duration of action of two or three days may supplant daily dosage. Another is the use of blockade agents of the nalline or cyclazocine type. The ongoing use of these turn off the euphoriogenic effect of opiates thus operantly conditioning the patient away from opiate drug use.

The chemical manipulation of the catachol

amine system has been reported to change the feeling tone of the opiate withdrawing person. Alpha methylparatyrosine, a non-addictive unnatural amino acid, has been used to suppress catachol amine production. The addict treated with it reports a decrease in "craving" for drugs. How this event will be shaped into a pharmacological strategem is unknown as yet, but it is conceivable that it could be used adjunctively with long term abstinence.

Opportunities are now available to reshape the social dimension of the opiate dependent person's life. Asking a chemical to provide an ambience to commence this work is appropriate. This aspect of the total treatment is a part of the medical model. We must go beyond the medical model as we ordinarily view it however. We must share the rehabilitation responsibilities with others whose expertise is in the behavioral aspects of the human condition.

It's the Law

Physician's Heart Attack after Giving Emergency Aid

A deep-sea diver was living in a pressurized tube. He was partly eviscerated when a sudden decompensation accident occurred. A physician and surgeon were sent immediately by helicopter to the pressurized tube. The physician and surgeon immediately performed emergency surgery. The operation took place under great physical and mental strain. The space was inadequate. The operation was performed with the two physicians on their knees. They had a pharmacist's mate for assistance. The operation required two hours of intense effort to save the life of the patient.

The physicians remained with the patient, pressurized in the chamber, for more than 54 hours following the surgery. The patient and the physicians were then transferred to another hospital where one of the physicians suffered what was later diagnosed as congestive heart failure, atrial fibrillation, physical exhaustion, and arteriosclerotic heart disease. This was determined to have been aggravated by long hours of work, by obesity and by excessive smoking. His attack was precipitated by the stress of the previous three days but was not felt to be a new disease.

The physician attempted to recover damages from the diving company because of his heart attack. Court ruled that the diving company had no special duty to the physician to prevent him from working under conditions of excess strain. Indeed, it was noted that the physician was compensated at the rate of \$200 per hour, with an additional \$100 per hour for all the time spent in the diving chamber. The diving company did pay these fees.

The court further ruled that the physician was well paid to undertake the sort of risk that caused the heart attack and that the diving company could not be held negligent for development of arteriosclerotic heart disease.

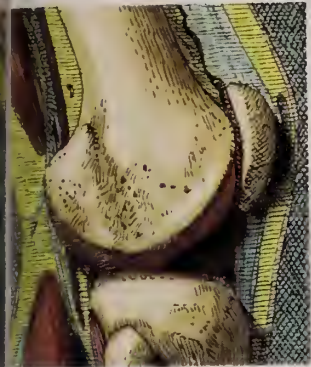
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Minneapolis, Minnesota

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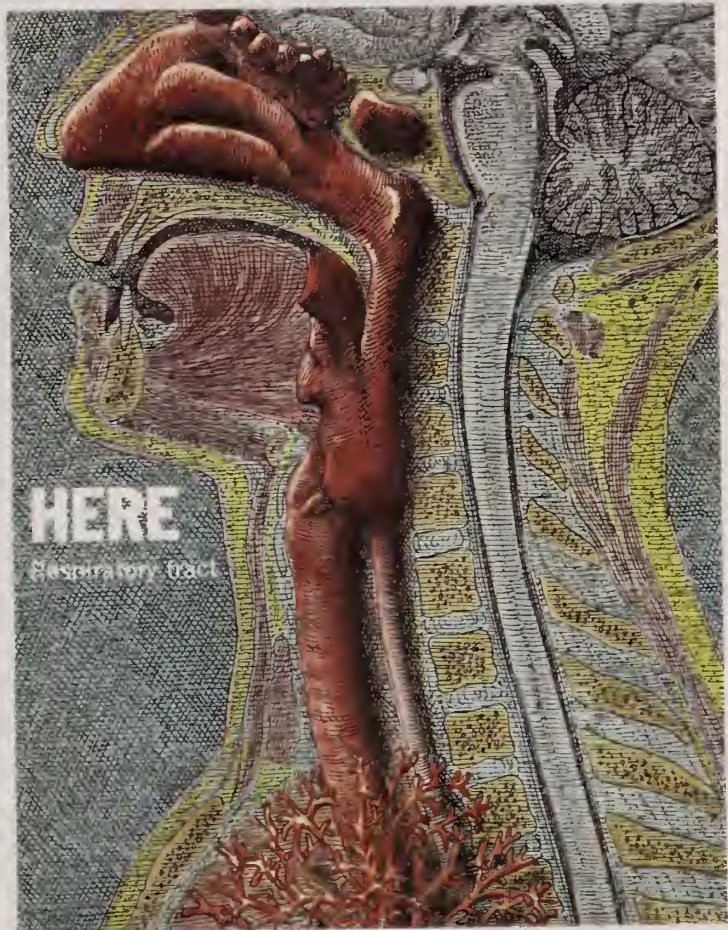
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Indications: Lomotil is effective as adjunctive therapy in the management of diarrhea.

Contraindications: In children less than 2 years, due to the decreased safety margin in younger age groups, and in patients who are jaundiced or hypersensitive to diphenoxylate HCl or atropine.


Warnings: Use with caution in young children, because of variable response, and with extreme caution in patients with cirrhosis and other advanced hepatic disease or abnormal liver function tests, because of possible hepatic coma. Diphenoxylate HCl may potentiate the action of barbiturates, tranquilizers and alcohol. In theory, the concurrent use with monoamine oxidase inhibitors could precipitate hypertensive crisis.

Usage in pregnancy: Weigh the potential benefits against possible risks before using during pregnancy, lactation or in women of childbearing age. Diphenoxylate HCl and atropine are secreted in the

breast milk of nursing mothers.

Precautions: Addiction (dependency) to diphenoxylate HCl is theoretically possible at high doses; do not exceed recommended dosages. Administer with caution to patients receiving addicting drugs known to be addiction prone or having a history of drug abuse. The subtherapeutic amount of atropine is added to discourage deliberate overdosage. Strictly observe contraindications, warnings and precautions for atropine; use with caution in children since signs of atropinism may occur even at recommended dosage.

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and respiratory depression which may occur

12 to 30 hours after overdose. Evacuate stomach by
lavage, establish a patent airway and, when neces-
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Editorials

Are These Our Concern?

THIS ISSUE OF MINNESOTA MEDICINE which deals with several facets of drug abuse and the attendant dependency problems (addiction) is presented in the hope of stimulating serious physician interest and concern in the current dilemma which involves everyone.

The era of "Better Living through Chemistry" is here. We are better off because of it—if it were not for drug abuse and the attendant dependencies.

We physicians and our medical associations are an integral and important part of this complex, troublesome and puzzling situation. Some say we are central to it. Whatever our part, we cannot be indifferent or unconcerned. As members of the only legally prescribing profession we must assume responsibility to assist in its amelioration—if not its resolution.

Everyone can be certain of the following:

1. The present trend toward increasing abuse and dependency will continue unless forces are initiated to counteract it. It will not abate or disappear by wishful thinking.
2. It cannot be solved by legislation. We would do well to keep in mind Spinoza's comment: "He who attempts to determine all by law foments rather than lessens crime," Governor Rockefeller's recent proposal to the New York State Legislature notwithstanding!
3. The trend cannot be stopped by inhibiting the seller. The primary target of attention is the user—your patient or potential patient and mine.
4. Drug abusers and dependents will not be stopped by scare tactics, moralizing, viewing them as criminals or by threatening increasingly stiff penalties.

5. Solutions will be realized only when all concerned join forces in cooperative effort of analyzing, planning and programming.

If these assumptions are valid, we can do the following:

1. We can strive to be better informed and less judgmental and hasty in formulating our opinions.

Basically youth today is no different from youth at any age. Youth has always involved protest. What is different from previous generations is the overt ways of protest and the coalescing of larger segments of youth than at any previous time. Too many of us, forgetting our own protest years, are often too severe in our judgments, particularly when the use of drugs is a part of the scene. In such circumstances, the tendency is to view the individual either as a criminal or immoral which interferes with the fulfillment of our basic obligations as a physician. The explanation for such reactions may well be related to the frustrations and feelings of inadequacy we have when attempting to deal with complex problems.

2. We need to rethink our positions regarding the laws passed for control of harmful or presumed harmful drugs. We need to know that the Marihuana Tax Act of 1937 was passed by Congress only after the Federal Bureau of Narcotics had subjected the public and Congress to alarming, unfounded statements concerning the terrible consequences of its use, this despite Marijuana having been used by people of the Orient for thousands of years. The situation is so confused and out of hand today that a researcher trying to conduct a well controlled study to determine its therapeutic effects would not be permitted to try nor could

he find the necessary funds to finance it—in reality a miserable state of affairs.

3. Abuse and dependency problems include not only the psychotropic chemicals but also alcohol and tobacco. Some would add coffee and tea. In fact there is greater abuse of alcohol and more dependency problems related to it than any other drugs or combination of drugs. Needed is a better perspective on the total problem. Further, abuse and dependency problems may be more extensive and severe in age ranges beyond 30.

4. We must ask ourselves how much we contribute to abuse and chemical dependency. "Drug-stores in 1967 filled 178 million prescriptions affecting mood and behavior. The number of new prescriptions was 65 percent higher than in 1958, whereas the number of new prescriptions for all other drugs rose only 35 percent."¹

How do we explain the significant increase in the prescribing mood and behavior altering drugs in the 10 year interval? Are we prescribing as a way of handling some of our own anxieties when we cannot define a disorder? Are we not differentiating a "medical problem" from a "psycho-social problem?" "... when a physician prescribes a drug for the control or solution (or both) of personal problems of living, he does more than merely relieve the discomfort caused by the problem. He simultaneously communicates a model for an acceptable and useful way of dealing with personal and interpersonal problems."² Is this what we should be doing?

Why are nearly half of the prescriptions issued on an "as needed basis" for doses below recommended levels for effective use?³

Important to understanding and controlling drug abuse and dependency is cooperation with others, particularly the legal profession. Needed is a critical review of *all* legislation regarding drugs with a view toward revisions and improvement.

"There are endless debates over whether addicts are criminals or sick people, and whether they should go to jail or hospitals. Are the jails to take over the medical problems or must the medical profession undertake to solve the criminal problems? Should every correctional institution be forced by law to provide medical and psychological treatment facilities for addicts? Or should addicts be put in treatment facilities and never sent to jail? These questions will be adequately answered only when the medical and legal professions work together to achieve some agreement about them. But there will be no easy answers just as there have been none in the matter of alcohol abuse."⁴

Cooperation is also essential with the courts, the educators, community and governmental agencies including the legislatures.

Only by cooperative efforts with others can we be assured of any degree of success. This may be difficult because we physicians have not been very successful cooperators in the past. In my opinion it would be worth a try!

Reynold A. Jensen, M.D.
Guest Editor

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How Can We Help?

DR. JOSEPH H. BRENNER* has said that the handling of the drug situation in our society is too serious and too difficult to be entrusted to politicians, and he has suggested that what we need now are people more directly concerned with individual welfare—physicians, for example—to become interested and knowledgeable in this field. In that connection, he goes on to say:

*Medical Department, Massachusetts Institute of Technology; Director, Cambridgeport Medical Clinic, Cambridge, Massachusetts.

"Despite many assertions to the contrary, a vast amount is known about the various drugs that are illicitly used, and especially about marihuana. To suggest that the gaps in our knowledge of the effects of marihuana are so great as to paralyze our ability to formulate reasonable policies governing prescription and/or proscription of its use, is to allow free rein to all those who advocate the attachment of severe penalties to the use of marihuana."¹

Just to mention the possibility of seriously con-

considering legalization of marijuana is to risk alienating many of our colleagues, who associate that idea with radicals and far-out freaks. So it seems appropriate to quote briefly from William F. Buckley, editor of *NATIONAL REVIEW* and one of the United States' best-known conservatives, on his subject:

"Our responsibility is to move ahead of public opinion: indeed to influence public opinion. Mr. Cowan² insists quite simply that there are no arguments, of any force or gravity, by which to justify the treatment routinely given to people who

use marijuana here and there in the United States. I flatly agree with him."³

If, as Mr. Buckley suggests, it is the responsibility of conservatives to move ahead of public opinion, how much greater is it our responsibility, as physicians, in this medically-related matter, to move ahead of and to influence public opinion? At best, to say we don't yet know enough is a weak (and inaccurate) excuse; at worst, it is a shameful "cop-out." The community to whose welfare we are dedicated deserves better than that.

Robert G. B. Bjornson, M.D.
Guest Editor

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On Words Not Found in Dictionaries

THE EDITORIAL BOARD of this Journal has a flexible neological policy. It is unlikely that many new words not dignified by an entry in one or the other of the great English dictionaries* will enter the language through these pages. Ours is a cautious and conservative Board which wants to be sure before launching a neologism that (1) no known word in the English language will express the idea and nuances of the new word and (2) that there is a new idea or thought requiring expression. We will not be so reactionary as to deny authors their right to accouchement of a literary baby if their infant word can qualify. Unfortunately very few can meet these simple standards. But we are not arguing for zero population growth of dictionary entries. The Oxford English Dictionary has just brought out (at \$50.00) a supplement of 1331 pages of new words added to the language since 1933. Of course, this is just A-G with two more volumes to come. One might plaintively say the language is full of words already and advise authors to use the well known and understood ones before resorting to new coinage. The newly

coined word might well be counterfeit not equal in value to the old expression.

These remarks are intended to apply to the written word used in context and not to a glossary such as addiet's language published elsewhere in *MINNESOTA MEDICINE*.[†] It is evident that some of these words are designed not to express a new thought but to conceal it. The "pusher" does not hawk his wares on the street corner: "Heroin for sale here"; but whispers hoarsely, "Horse."

The argot of the socially unacceptable, of thieves, whores, prisoners, and "junkies" is designed more for obfuscation than revelation. As the word is understood by the "squares," "fuzz," "nares" etc. new expressions appear, thus "deek," "dope," "hit," "junk," "stag," "smack" and many others, all meaning heroin. Some of these will remain in the language.

We must distinguish between the new word intended for camouflage that will die when its cover is blown, and the word that expresses a new idea which has a place in the changing language.

Reuben Berman, M.D.
Editor

Chemical Dependency

THERE WAS A time when the term "chemical dependency" described a phenomenon which was considered by the general population to be rela-

tively insignificant, unimportant, perhaps a rarity. The term may have evoked visions of an Asian opium den, or the South American Indian driving

his body by chewing coca leaves; or a pariah, possibly a musician, in New York City. A generation ago drug dependency seemed remote. In the last decade, this has changed. Chemical dependency is now seen pervading all levels of society, here and elsewhere.

Clearly, there has been a massive increase in the use of chemicals to alter the state of consciousness of the user. It is also probable that there has been an increased willingness by many users to experiment with various chemicals to produce a change in thinking or feeling. But in addition to the actual increase in drug use, there may also be an increasing awareness that chemical dependency is not confined to foreigners, outcasts, and youth, but that chemical dependency may also exist in the person who uses alcoholic beverages, hypnotics, tranquilizers, stimulants, appetite suppressants, or analgesic drugs in certain ways. Chemical dependency is a broader concept

than the term it is supplanting, drug addiction, and chemical dependency affects many persons who never considered themselves to be drug dependent.

Physicians have traditionally been interested in the effect of chemicals upon the human body. Pharmacology and toxicology have long been part of the basic medical science curriculum. The rapidly burgeoning number of chemicals of abuse which are being used have resulted in the situation in which a physician finds it difficult to remain abreast of developments in this area. The members of the Subcommittee on Alcoholism and Drug Abuse of the Committee on Mental Health of the Minnesota State Medical Association are very pleased that this issue of MINNESOTA MEDICINE is being devoted to papers dealing with aspects of chemical dependency.

David B. Auran, M.D.
Chairman, Subcommittee on
Alcoholism and Drug Abuse

Pregnancy

THE USE OF DRUGS in pregnancy has become of great concern with some of the teratogenic crises that have occurred in recent years.

Current information available indicates that with few exceptions every drug given the mother reaches the fetus regardless of the stage of gestation at which it is administered. It has also been proven that the specific effect of any drug on the fetus is dependent on the stage of fetal development at the time it is given to the mother. The most dangerous time for drug administration is the first trimester of pregnancy during which organ and limb formation and development occurs.

Recent data would show the drugs used for therapeutic purposes in pregnancy may cause late effects on the offspring. The data concerning the

development of adenocarcinoma of the vagina in girls in their teens and early twenties whose mothers were treated with stilbestrol and other estrogens during pregnancy to prevent abortions is very suggestive of a cause and effect relationship.

Therapeutic nihilism is not popular but the very conservative use of medications during gestation is the only way to avoid both short and long range dangers to the fetus.

In the period of greatest danger many women are not even certain they are pregnant. It therefore behooves all physicians dealing with female patients in the reproductive age group (age 13-45) to take a menstrual history before prescribing medication if injury to the fetus at the time of its greatest susceptibility is to be avoided.

Peter E. Fehr, M.D.*
Minneapolis, Minnesota

*Clinical instructor on the University of Minnesota OB-GYN Staff, Minneapolis, and in private practice in Minneapolis.

OLD DOC HESS SAYS: Distorted, askewed, unreliable figures, expressed by a famous name, too often are repeated as a reliable fact. . . . C.O.R.

The Physician and Public Opinion Concerning Drug Addiction

IT IS REFRESHING to find a lawyer performing a careful study of the history of laws regarding the use of drugs in the United States. The paper in this issue entitled "A Lawyer's Autopsy On Our Dead Drug Laws" by James P. Cullen,* provides a background for serious criticism of the current situation with regard to the entire problem. No physician doubts that drug addiction is a serious medical matter and that much harm is done by virtue of the fact that many persons do become addicted to one or another pharmacologic agent. As the author of this paper points out, purported remedies can oftentimes be worse than diseases.

There are many reasons for opposing the acceptance of currently accepted dogma concerning the best way to control the improper use of drugs of various sorts, including especially psychotropic drugs. Actually, the most serious social problem in connection with addiction to psychotropic drugs is related to our current method of attempting to control their use by forcing addicts to pay exorbitant prices from illicit dealers to meet the problems of their drug dependency. Our society has in effect driven addicts into violent crime to obtain the wherewithal to satisfy their acquired drives. It is generally conceded that at least half of the felonies committed in our larger cities are related to this phenomenon.

Even with respect to the more innocuous agents such as marihuana, the fact that it cannot be purchased except illegally, and because in many states possession and/or use are treated as felonies, persons addicted to the use of this deceptive weed also find themselves associated with the criminal underworld and become part of the criminal culture that is eroding civil tranquility.

Drug addiction is a disease. As such it should be treated by physicians not policemen, except when addicts commit overt acts against persons or property. The medical profession has turned its back on its responsibilities to public education in the matter. As a result, harsh criminal penalties for possession and use of psychotropic drugs have been enacted into law by state legislatures, sometimes on voice votes, and by the Congress, with less than proper consideration of the totality of the problems involved. There is still in the late

twentieth century American society a childlike belief that more stringent police measures can control addiction. The 1970 Drug Control Act properly sets up penalties for the illicit manufacture and sale of dangerous drugs, but it still leaves the addict in the category of a criminal. As Cullen points out, the Act also introduces legal authorization for invasion of privacy, such as "no-knock" entry, which could be readily abused.

It is not as though there are no models for better mechanisms for control in the world. The British system, in which the physician does have responsibility has proven to be vastly superior to the current American plan for control of improper use of psychotropic drugs.

A great many young people have become involved in the use of marihuana. By making such use a felony or even a misdemeanor, we have brought thousands, in the aggregate undoubtedly hundreds of thousands of our young people into the criminal subculture of our society and have destroyed many lives. There is an ethical problem here for society as a whole but especially for physicians who have not insisted upon dealing with drug dependency as a medical rather than a law enforcement problem.

There has recently been published a perceptive essay on this subject by Mervyn and Deborah Silverman¹ which deals with the ethical responsibilities of physicians in relation to problems of drug abuse. Dr. Mervyn Silverman is Director of the Office for Consumer Affairs of the Food and Drug Administration of the U.S. Department of Health Education and Welfare. The Silvermans say: "We need to realize that eradication is an unrealistic goal, so that we can settle down to a constructive, long-term solution. Society, like the drug abuser, must stop believing in the magic of any single cure for its problems, and institute a sane complex of effective measures. Any action in the name of moral values is empty principle if it is not based on the facts. . . . We need new facts, strong pressure groups from the ranks of concerned professionals, and education of public opinion."

No ethically acceptable solution of the drug addiction problem can occur unless and until physicians accept their own moral responsibilities

*See page 223.

to their patients and to society, in public education and in promoting research on methods of medical management. No disease is destroying more young lives today than is drug dependency. It is a major challenge to the medical profession to bring sanity

into the public dialogue that will determine political action in this field. The American medical profession has for too long closed its eyes to the entire problem.

Maurice B. Visscher, Ph.D., M.D.
Minneapolis, Minnesota

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New Drugs in Pregnancy

LITTLE IS KNOWN about the effect of most drugs on human pregnancy. Those that have definite adverse effects such as thalidomide are fortunately rare. With few exceptions, manufacturers tell us that a drug's effect on human pregnancy is not known and should be used only when its beneficial effects overbalance its hazards (which we have already been informed are unknown). When will these effects be known? Probably not early in the history of the marketing of new drugs since rarely is it adequately pretested on the pregnant woman.

In the absence of facts, avoidance is an excellent alternative. Mandatory medication in pregnancy is unusual. Patients, as well as physicians,

are concerned about a drug's effect when pregnancy is known and should be encouraged to use drugs less frequently during this time.

The most dangerous period is in the first eight weeks, when pregnancy is often unsuspected, unfortunately by the physician as well as the patient. For purposes of drug control a menstruating female should be assumed pregnant until proven otherwise.

When prescribing medication, a preliminary question is always, "Do you have any drug allergies?" Might not the next question be, "Are you pregnant or might you be in the near future?"

David L. Hill, M.D.
Hennepin County General Hospital

Cover Sculpture

"Bayanihan"

"Bayanihan" is Tagalog and translated means "working together." Dr. Donald L. Carlon, a radiologist in Moorhead, has been doing both welded and cast metal sculpturing for approximately four years. The cover sculpture is 21 inches high and is a lost wax, bronze casting. He told the editors that the subject is an exercise of the human body in relationship to itself.

Dr. Carlon is a graduate of Syracuse University Medical School in New York and did his postgraduate work at the Mayo Clinic.

Adolescent Medicine

February Issue

Many of the articles published in the February issue of MINNESOTA MEDICINE were presented at the Second Annual Medical Seminar of the West Bank Medical Center (Fairview Hospital and St. Mary's Hospital) in Minneapolis, April 15, 1972.

First Do No Harm

"One must question whether physicians, who are most likely to have positions of leadership in directing professional drug abuse rehabilitation programs, are adequately trained for the tasks of diagnosis and coordination of delivery of diversified services."

THIS QUOTATION is from a recent article* reporting on a survey of medical schools in the United States. The study was "devised to explore whether schools training future physicians, nurses, pharmacists, psychologists, social workers and lawyers were providing training resources that are needed to effectively change the life styles of drug abusers." In commenting on the success of medical schools in this regard, the authors stated that ". . . Medical students are most often trained in the pharmacological and medical facets of this condition [drug abuse]. The drug abuser's psyche is taught about less often and legal issues are covered least of all. *It would appear that the future physician is at best, only prepared to handle bodies affected by drugs with the aid of other drugs.*"

Nearly two out of three medical schools responded to this study with more than 80% indicating that drug abuse is part of their course curriculum. It would seem that medical students are, for the most part, receiving some training in drug abuse.

It is not by accident, however, that an entire alternative health care delivery system, in the form of half-way houses and drop in/crisis intervention centers, has developed to fill the void left by the medical profession. The public is telling the medical profession that the physician and his methods are inadequate to meet the needs of the drug abuser. This loss of confidence in physicians to deal competently with problems of drug abuse leads to a loss of confidence in other areas of health care. The physician and physician-in-training have a responsibility to establish competent, helpful, health service systems to deal with drug abuse rehabilitation and prevention or at the very least to cooperate with and aid the alternative delivery systems which have, out of necessity, developed.

The problem of drug abuse is a multi-faceted one encompassing medical, legal, pharmacological and sociological considerations. In devising a curricular solution, therefore, one must incorporate multi-disciplinary principles.

At the University of Minnesota, a course in "Drugs and Society" is offered at the College of Pharmacy. The course, which incorporates principles of psychology, sociology, medicine, law, communication, education and pharmacology, is offered to all of the health science students at the University. It includes guest lecturers and field experiences. It fosters a team approach, enabling students from diverse backgrounds to work together toward the solution of societal problems. Out of the 160 students taking the courses this quarter, from the schools of medicine, law, nursing, pharmacy, occupational therapy, physical therapy, psychology, sociology, public health, hospital administration and social work (with no more than 18% representation from any one discipline) —medical students account for less than 3% of the registrants, although the course is an approved elective in the medical school. The remaining medical students are receiving their "training" in drug abuse in a few hours in their pharmacology and community practice sequence, isolated from other disciplines.

The answer is *not* to offer a required medical school course in drug abuse, since that would defeat the interdisciplinary environment even if the multi-disciplinary presentation of material could be mimicked. The answer, if the medical profession is to meet its responsibilities to the public through the training of medical students, is to cooperate with the other disciplines at the University by actively encouraging the medical student to get involved in the prevention and treatment of what a recent Gallup Poll indicates is the third greatest problem our country faces today and perhaps, if necessary, offer a supplementary medical component for medical students.

Marc G. Kurzman, B.S., R.Ph., J.D.†

*Drug Forum 1:239, 1972.

†Drug Education Legal Specialist at the University of Minnesota and Assistant Professor in Clinical Pharmacy.

Letters to the Editor

In the August 30, 1972 Memorandum, "To All Members of the Medical Staff," from the Chief of the Medical Department and the Director of Medical Education, "Bureaucratese" took over as an attempt was made to announce, "A Nurse Utilization: Patient Care Systems Project," describing the "IDEALS methodology" and the "Use of multidiscipline approach in designing the systems" as it pertains to "the patient outward." ". . . virtually every area of the health care field involved themselves in the design of the patient care systems;" and the "interrelated systems" which were "fully designed and implemented" as could be found in the "Nursing Outlook, Vol. 4, No. 2." I guess that means that we are going to be given a course on how to take care of patients.

This reminds me of an occasion at the time of World War II when a layman, neighbor of mine, asked me if I would serve on the Emergency Care Units. I promptly agreed, but was then instructed that it would be necessary for me to take the course in Bandaging, Pressure Points for Massive Bleeding, Resuscitation Methods, etc., etc., and if I passed the course I would be approved. I thanked him, but I did not offer to take the course and presumably flunked the preliminary as I never again heard of it. So when I see that our own Metropolitan Medical Center is having a Conference which was scheduled for September 14, teaching us how to take care of patients, "with total clinical responsibility . . ., structuring . . ., collecting . . ., interpreting . . ., and documenting of patient information," then I feel like saying, "Well, thank you, if you need any professional assistance, let me know."

Carl O. Rice, M.D., Ph.D.
Editor Emeritus

It was interesting to read Dr. Reece's laboratory letter in the November* issue of MINNESOTA MEDICINE.

Additionally thinking of brain sources of elevated CPK—Alzheimer's disease also causes elevation of CPK.

The hypothyroidism elevation caused us a degree of concern a few years ago, before we realized that this elevation was due to the hypothyroidism.

Chas. M. Bagley, M.D.
Duluth, Minnesota

*Page 1046.

I enjoyed Dr. Reece's laboratory letter* in the November MINNESOTA MEDICINE but I feel you missed an opportunity to make a point with regard to correcting creatinine clearance values for body surface area.

I feel that it is a point well worth stressing that the clearance values can only be adequately interpreted in respect to the correction for a body surface area and that simple numerical value in itself cannot be adequately interpreted unless correction is stated or the units given.

It is a small point, but I think it is deserving of emphasis.

John M. Burns, M.D.
St. Paul, Minnesota

*Page 1046.

"The history of science, and in particular the history of medicine... is... the history of man's reactions to the truth, the history of the gradual revelation of truth, the history of the gradual liberation of our minds from darkness and prejudice."

—George Sarton, from "The History of Medicine Versus the History of Art"

**Are there significant
differences in bioavailability
and clinical predictability
among drug products?**

Opinion

Results of a questionnaire to
7,000 physicians:

44.6%

Agree there is a significant
difference

24.9%

Believe there is no difference

30.5%

Had no opinion

Are there significant differences in bioavailability and clinical predictability among drug products?

Teacher of Medicine

Alfred Gilman, Ph.D.
Wm. S. Lasdon
Professor & Chairman
Department of
Pharmacology
Albert Einstein
College of Medicine of
Yeshiva University



I think that there can be a very great distinction between generic drugs and brand name drugs. And that applies to products of original research that have outlived their patent protection as well as to drugs that have long been in the public domain. Let me explain why.

The Importance of the Manufacturing Environment

In terms of formulation, quality control, and the ability to reproduce an essentially identical product, batch after batch, I doubt that many firms are properly equipped to put out a product that is as carefully controlled as the product marketed by a pharmaceutical company with sophisticated research and high quality manufacturing facilities. For example, when a company comes out with its own preparation of a drug that has just lost its patent protection, there is no assurance that the drug it produces will be a therapeutic equivalent. The raw material could be identical and yet bioavailability might vary from complete unavailability to that which is equivalent to the original.

It Isn't Enough to Meet USP and NF Standards

Meeting USP and NF standards is not enough to guarantee therapeutic equivalence. In certain instances, stricter standards must be applied. Right now, the New York Heart Association has a committee that is studying the problem of digoxin equivalent-

lency. I am certain that they are going to recommend a bioavailability assay of a particular digoxin. Unless this is done, they will not recommend it for purchase or use in New York City hospitals. It represents too much of a hazard. They have gone so far as to recommend a batch-by-batch certification of bioavailability even though the company has been reproducing and marketing a digoxin product through the years.

The Problem of Controlling Bioavailability of Generics

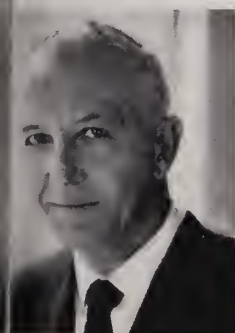
The FDA does not have the manpower to inspect the quality control capabilities of hundreds of houses specializing in generic products. And I don't think that the average pharmacist is knowledgeable or aware of the quality and bioavailability of the infinite numbers of generic preparations. A recommendation has been made that every time a generic house (or for that matter a large pharmaceutical company) markets an already existing drug for the first time, a modified new drug application should be submitted. The manufacturer would have to show that his compound is the therapeutic equivalent of the standard compound in use, assuming that the standard compound is one that has been available for an extended period—say 15 years. This would be one indication that the control of bioavailability is beginning to get the attention that it deserves.

Clinical Predictability More Important Than Price

Although the question of price has been greatly exaggerated, it is true that patients can often save money on generic drugs. But you are going to dare attempt to save money if it jeopardizes patient's health. Let us turn to the example of cardiac glycosides. In recent years, these drugs are probably the most common drugs we use with respect to the small difference between a maximally effective dose and a toxic dose. If you are dealing with a drug of this type, the physician's concern must be clinical predictability. At the time of variations in bioavailability, it would be sheer folly to try to save the patient what might amount to maybe \$10 or \$20. The physician cannot afford to age his patient unless he is sure that the drug prescribed has the same positive effect each time the prescription is renewed. This is especially significant when the patient is on the product, not for himself but for the rest of his family.

Maker of Medicine

J. Cavallito, Ph.D.
Executive Vice President
First Laboratories



minimize nonequivalence of drug components produced by different manufacturers. Arguments relate largely to the extent of product inequivalences. Experience over the past six years has uncovered a greater incidence of nonequivalence of products prepared by different manufacturers from generically equivalent substances than many had previously surmised.

Newer Bioavailability Studies Reveal Differences

though equivalence of ent preparations of a substance may be de- by certain physical, cal or biological char- actistics, identity is not assured even though characteristics may scribed in compendia as the USP, NF or de- l by other specific e standards. More- even with equivalent substances, similar maceutical products e produced by differ- manufacturers such these products are bio- ally or therapeutically ivalent.

Growing Awareness of Potential for Nonequivalence

experience increases drug substances de- from different sources under different condi- , it should be possible blish specifications in icient detail to minimize potential for their non- valence. However, e is general agreement product therapeutic valence would still not ssured even if one could

Bioavailability may be defined as a measure of the rate and amount of absorption of a drug substance from its administered dosage form. For several years pharmaceutical scientists have proposed that bioavailability data on presumably equivalent dosage forms provide the best measure of product equivalence—short of adequate clinical trial. In their continued search for shortcuts to the evaluation of product equivalence, medical and pharmaceutical scientists have increasingly relied upon bioavailability characteristics as reflected by blood levels of a drug after its administration to human subjects.

Leading manufacturers now conduct comparative bioavailability studies on their own product dosage forms after production process changes that would have been considered inconsequential a few years ago. This isn't surprising, since there are so many possible differences in production operations that the opportunities for inequa-

lent generic and brand name products are numerous—even when the production process begins with identical chemical substances. Moreover, reputable manufacturers are striving to improve *in vitro* control measures, such as dissolution characteristics, which are being related more meaningfully to bioavailability reference data.

As a result of advances in scientific instrumentation and analytical methodology which permit measurements of small quantities of drug substances in the body, our abilities to detect differences in bioavailability and possible therapeutic nonequivalence have appreciably improved.

Product Selection

Based on Patient Response

Improved specifications and standards can better assure the equivalence of drug substances. Manufacturers, compendia and regulatory agencies can all play a part. However, it is the drug product, not the drug substance, that the physician, pharmacist, nurse and patient-customer utilize. How can these indi-

viduals make or influence specific product selections to minimize variations in therapeutic equivalence of multisource drugs? Patients' responses to a drug product provide a basis of experience to aid the physician in his selection of a particular product. The nurse and pharmacist can also help detect patient responses, but ultimate responsibility must remain with the physician.

Reputation of Manufacturer as Basis for Product Selection

The physician, to assure that his patients receive quality health care, must rely upon the capabilities of the reputable pharmaceutical manufacturer who is equipped to develop, prepare and control a quality product of uniform, reliable therapeutic performance. Substitution with purportedly equivalent generic products that are only superficially evaluated by an imitator manufacturer can place the health of the patient secondary to factors of price or convenience for the provider.

Opinion & Dialogue

What is your opinion, doctor?
We would welcome your comments.



The Pharmaceutical Manufacturers Association
1155 Fifteenth Street, N.W., Washington, D.C. 20005



MINOCIN[®] made the difference in just eight days.*

Clinical Data:

Patient: 47-year-old male.

Diagnosis: Severe pyoderma, left hand.

Culture: *Staphylococcus aureus*, coagulase positive and sensitive to MINOCIN.

Temperature: 102° F

Therapy: MINOCIN Minocycline HCl Capsules, 100 mg: 200 mg *stat*, 100 mg every 12 hours. Medication began 9/7/71. By fourth day, temperature was normal and pustular lesions considerably improved. Last dose taken 9/14/71.

Concomitant therapy: None.†



Semisynthetic

MINOCIN[®]
MINOCYCLINE HCl

Capsules, 100 mg: 2 *stat*, 1 q 12 h.

Indications: For the treatment of susceptible infections; e.g., *E. coli*, *D. pneumoniae*. For full list of approved indications consult labeling.

Contraindications: Hypersensitivity to any tetracycline.

Warnings: The use of tetracyclines during tooth development (last half of pregnancy, infancy and childhood to the age of 8 years) may cause permanent discoloration of the teeth (yellow-gray-brown). This is more common during long-term use but has been observed following repeated short-term courses. Enamel hypoplasia has also been reported. Tetracyclines, therefore, should not be used in this age group unless other drugs are not likely to be effective or are contraindicated. In renal impairment, usual doses may lead to excessive accumulation and liver toxicity. Under such conditions, use lower total doses, and, in prolonged therapy, determine serum levels. Photosensitivity manifested by an exaggerated sunburn reaction has also been observed in some individuals taking tetracyclines. Advise patients apt to be exposed to direct sunlight or ultraviolet light that such reaction can occur, and discontinue treatment at first evidence of skin erythema. Studies to date indicate that photosensitivity does not occur with MINOCIN Minocycline HCl. In patients with significantly impaired renal function, the antianabolic action of tetracycline may cause an increase in BUN, leading to azotemia, hyperphosphatemia, and acidosis. CNS side effects (lightheadedness, dizziness, vertigo) have been reported, may disappear during therapy, and always disappear rapidly when drug is discontinued. Caution patients who experience these symptoms about driving vehicles or using hazardous machinery while taking this drug. **Pregnancy:** In animal studies, tetracyclines cross the placenta, are found in fetal tissues, and can have toxic effects on the developing fetus (often related to retardation of skeletal development). Embryotoxicity has been noted in animals treated early in pregnancy. Safety of use during human pregnancy has not been established. **Newborns, infants and children:** All tetracyclines form a stable calcium complex in any bone-forming tissue. Prematures, given oral doses of 25 mg./kg. every 6 hours, demonstrated a decrease

in fibula growth rate, reversible when drug was discontinued. Tetracyclines are present in the milk of lactating women who are taking a drug of this class.

Precautions: Use may result in overgrowth of nonsusceptible organisms, including fungi. If superinfection occurs, institute appropriate therapy. In venereal diseases when coexistent syphilis is suspected, darkfield examination should be done before treatment is started and blood serology repeated monthly for at least four months. Because tetracyclines have been shown to depress plasma prothrombin activity, patients on anticoagulant therapy may require downward adjustment of such dosage. Test for organ system dysfunction (e.g., renal, hepatic and hemopoietic) in long-term use. Treat all Group A beta hemolytic streptococcal infections for at least 10 days. Avoid giving tetracycline in conjunction with penicillin.

Adverse Reaction: GI: (with both oral and parenteral use): anorexia, nausea, vomiting, diarrhea, glossitis, dysphagia, enterocolitis, inflammatory lesions (with monilial overgrowth) in anogenital region. **Skin:** maculopapular and erythematous rashes. Exfoliative dermatitis (uncommon). Photosensitivity is discussed above ("Warnings"). **Renal toxicity:** rise in BUN, dose-related (see "Warnings"). **Hypersensitivity reactions:** urticaria, angioneurotic edema, anaphylaxis, anaphylactoid purpura, pericarditis, exacerbation of systemic lupus erythematosus. In young infants, bulging fontanels have been reported following full therapeutic dosage, disappearing rapidly when drug was discontinued. **Blood:** hemolytic anemia, thrombocytopenia, neutropenia, eosinophilia. **CNS:** (see "Warnings.") When given in high doses, tetracyclines may produce brown-black microscopic discoloration of thyroid glands; no abnormalities of thyroid function studies are known to occur.

NOTE: Concomitant therapy: Antacids containing aluminum, calcium, or magnesium impair absorption; do not give to patients taking oral minocycline. Studies to date indicate that absorption of MINOCIN is not notably influenced by foods and dairy products.

*Indicated in infections due to susceptible organisms. Culture and sensitivity testing recommended. Tetracyclines are not the drugs of choice in the treatment of any staphylococcal infection.
†Case Report, Clinical Investigation Department, Lederle Laboratories.



LEDERLE LABORATORIES, A Division of American Cyanamid Company, Pearl River, New York 10965 12-20 436-2

A Lawyer's Autopsy on Our Dead Drug Laws

JAMES P. CULLEN, J.D.*

ON OCTOBER 27, 1970, the Comprehensive Drug Abuse Prevention and Control Act,¹ was officially approved. Passage of this sweeping piece of legislation represented not only an attempt to codify in one package a hodgepodge of federal laws purporting to regulate the manufacture, distribution, sale, and possession of dangerous drugs, but also a shift in Congressional attitude toward the role of law insofar as it regulates drug "abuse".

The new federal drug control law is noteworthy for a number of reasons:

1. Its introduction of the novel concept of scheduling "controlled substances" in accordance with certain recited findings² and punishing their unlawful sale or distribution on the basis of the schedule in which they are included. This approach is markedly different from the past legislative practice of terming and defining most dangerous drugs as "narcotics" despite, and in apparent ignorance of, their gross pharmacological and medical differences.

2. The shift in emphasis with regard to penalizing possession offenses. Under prior law possession offenses were barely distinguishable from sale offenses with respect to the severity of penalties which could be imposed upon conviction.

The new drug law contains a clear mandate to federal law enforcement authorities to concentrate their efforts on unlawful manufacture, sale or dis-

tribution offenses. In addition to the requirements that unlawful possession be both "knowingly and intentionally", the Congress has seen fit to limit the maximum penalty upon the first offense conviction for unlawful possession of *any* controlled substance to a maximum sentence of one year imprisonment or a \$5,000 fine or both. The maximum sentence which may be imposed upon conviction of second and subsequent offenses of unlawful possession is two years imprisonment or a \$10,000 fine or both.³

3. Specific provisions of the Act now make it possible for an offender to be placed on probation in lieu of the court entering a judgment of guilty and further, if he qualifies, to obtain an expungement of all recordation relating to his arrest, indictment or information, trial, finding of guilty and dismissal and discharge.⁴

4. The re-emphasis and strengthening of the quota system insofar as it applies to the manufacture of dependency producing and otherwise dangerous substances. This is in part achieved through the requirement of more detailed reporting.⁵ It is further achieved by the Attorney General's determination and setting of manufacturing quotas and the granting of limited authorizations for drug manufacture.⁶ The availability and use of "administrative inspection warrants"⁷ substantially

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See editorial, page 215.

1. 84 Stat. 1236, 21 U.S.C. §801 (1970).

2. 84 Stat. 1247, 21 U.S.C. §812 (1970).

3. 84 Stat. 1264, 21 U.S.C. §844 (1970). There is an exception to the limited sentence approach if the defendant is found to be a "dangerous special drug offender". In that instance a defendant can be sentenced for an "appropriate term not to exceed twenty five years." 84 Stat. 1267, 21 U.S.C. §849 (1970).

4. 84 Stat. 1264, 21 U.S.C. §844 (b). The expungement privilege is extended to those who were not over twenty-one years of age at the time of the offense. Query: is the spirit of misadventure limited to the young? If answered in the negative, is this not an arbitrary classification in violation of the due process clause of the 5th Amendment? See *Shapiro v. Thompson*, 394 U.S. 618 (1969), and *Bolling v. Sharpe*, 347 U.S. 497 (1954) which indicate that the right to due process under the fifth amendment includes within its guarantee the principle of equal protection.

5. 84 Stat. 1258, 21 U.S.C. §827 (1970).

6. 84 Stat. 1257, 21 U.S.C. §306 (1970). It should be noted that the power of the Attorney General to establish production quotas is limited to those substances included in Schedules I and II. Only recently methamphetamine (speed) was moved from Schedule III to Schedule II, ostensibly for the purpose of subjecting this substance and its manufacturers to the quota provisions of the law.

7. 84 Stat. 1274, 21 U.S.C. §880 (1970). These warrants are issued on the basis of "probable cause" which "[m]eans a valid public interest in the effective enforcement of this title or regulation thereunder sufficient to justify administrative inspections of the area, premises, building or conveyance or contents thereof, in the circumstances specified in the application for the warrant." 84 Stat. 1275, 21 U.S.C. §880 (d) (1) (1970).

strengthens this quota and authorization scheme. Needless to say the illicit manufacture or distribution of dangerous drugs ought to be treated from a criminal standpoint in as punitive a fashion, if not more, as their sale on the street corner. It is only recently, however, that federal law enforcement authorities have begun to "crack down" by arrest or indictment.⁸

5. The establishment of a Commission on Marihuana and Drug Abuse.⁹ This Commission, whose membership consists of two members of the Senate, two members of the House of Representatives and nine members appointed by the President of the United States, represents an apparently sincere attempt on the part of the Congress to inform itself on the subject. Not so clear, however, is the weight which will be given to this Commission's reports and proposals for legislative action.

There are several other provisions of the new drug act deserving of professional attention. Noteworthy among these are the shift from the taxing power to the interstate commerce power as the constitutional basis for this drug legislation,¹⁰ the increase in funds made available to mental health centers and similar institutions for the purpose of treating those with "drug dependency" problems as well as those with opiate addiction problems¹¹ and the granting of important powers to the Secretary of Health Education and Welfare.¹²

On the other hand, a pervasive examination of the new act discloses numerous deficiencies. Notable among them are provisions authorizing the issuance of "no knock" search warrants,¹³ sum-

mary forfeitures of property,¹⁴ and the preferential treatment accorded a manufacturer who has exceeded his production quota or has engaged in the manufacture of an unauthorized substance.¹⁵ The inclusion of marihuana in Schedule I, which includes such drugs as heroin and cocaine, and the complete absence of any regulation of either ethyl alcohol or nicotine creates further cause for concern.

Considering the above points of controversy together with the obvious fact that our criminal justice system continues under present law to be the modality into which most drug offenders are channeled by society, one might well hesitate before opining on the value of this legislation as a reform measure. It is this author's opinion, however, that the new federal act has much to be said for it, not only because of its desirable substantive reforms, but also because of the spirit in which it was enacted.

It can be fairly concluded that passage of the Controlled Substances Act was an attempt by Congress to legislate away from the failure and pitfalls of prior law. Indeed this legislative action can be viewed as an endeavor to inject some credibility into a milieu replete with falsehood and credibility gaps. The simple requirement, for example, that before a substance may be lawfully controlled by the Attorney General there must be "substantial evidence of potential for abuse", coupled with the research and study aspects of the Act, would seem to hold some promise for mean-

8. On January 18, 1972, federal officials announced the seizure of 1 million amphetamine pills worth approximately 1.5 million dollars. These pills had been exported to Mexico by the Strassenburgh prescription products division of the Pennwalt Corp. and then smuggled back into the United States. Eighty persons were arrested by the Bureau of Narcotics and Dangerous Drugs as a direct result of their ten month investigation of this particular problem. Minneapolis Star, Jan. 18, 1972, at 2A, col. 1.

9. 84 Stat. 1280, 21 U.S.C. n. at §801 (1970).

10. See 84 Stat. 1242, 21 U.S.C. §801 (3)-(6) (1970). It is made very clear that "Federal Control of the intrastate incidents of the traffic in controlled substances is essential to the effective control of the interstate incidents of such traffic." 21 U.S.C. §801 (6).

11. 84 Stat. 1239, 42 U.S.C. §2688n-1 (1970).

12. For example, the recommendations of the Secretary of Health, Education and Welfare regarding scientific and medical matters and whether a particular substance should be legally controlled are binding on the Attorney General. 84 Stat. 1246, 21 U.S.C. §811 (b) (1970).

13. 84 Stat. 1274, 21 U.S.C. §879 (b) (1970). The U.S. Supreme Court decision in *Ker v. California*, 374 U.S. 23 (1963), upholding a conviction for possession of narcotics was a weak adoption of the rule that "exigent circumstance" will justify an officer in failing to announce his authority and purpose before entering a residence. The language contained in the cited No-knock Statute is a paraphrasing of the exigent circumstances rule enunciated in *Ker*. See also *State v. Parker*, 283 Minn. 127, 166 N.W. 2d 347 (1969), which is the general authority for No-Knock search and seizures in Minnesota.

14. 84 Stat. 1276, 21 U.S.C. §881 (1970). Among the property subject to forfeiture is "[V]ehicles . . . which are used . . . to transport or in any manner to facilitate the transportation, sale, receipt, possession or concealment . . ." of controlled substances. 84 Stat. 1276, 21 U.S.C. §881 (a) (4) (1970). Under this provision one transporting or possessing a joint of marihuana in the glove compartment of his automobile faces potential seizure and forfeiture of that vehicle. Query as to whether or not such forfeitures constitute excessive fines in view of the fact that they are in addition to any fine or imprisonment which may be levied or imposed upon conviction of the underlying offense. If so then the Eighth Amendment may have some vitality in this area of controversy.

15. See 84 Stat. 1262, 21 U.S.C. §842 (c) (1970). Such offenses are subject to a "civil penalty" of not more than \$25,000 unless "knowingly" committed, in which case it is possible that the offender (if he can be identified) may be sentenced to imprisonment for not more than one year or a fine of not more than \$25,000, or both. This "light" penalty is a good example of an unwarranted legislative distinction between "white collar" crime and that committed by others.

ful remedial legislation in the near future. I attend myself on this point because such an approach, from a governmental standpoint, of educating oneself prior to legislating dramatically stands apart from the conduct, attitude and approach of governmental officials in the past. Unfortunately the general public, due to their own ignorance on the subject, is quite incapable of appreciating this fact—and, I submit, physicians and lawyers as well.

The respect to which any law is entitled from the public depends on a variety of factors. The fairness or "morality"¹⁶ of a given law is important, particularly with respect to criminal laws and the conduct they proscribe. Due consideration must be given to insuring that application of a law will not violate fundamental and constitutional rights of individuals. Certainly the efficacy of a law in securing its desired objectives provides a further standard with which to pass judgment on the value of a given legal command or restraint. There are other considerations—suffice it to say, however, that the process by which a law is developed is a fundamental and perhaps the threshold point for evaluating and insuring its fairness and validity. So it is that our legislative process and the legislators themselves are of such extreme importance to a just society.

Changeable as they may be through the democratic process of bills, committee hearings, debates and votes, most laws (criminal laws in particular) represent a divining by a few powerful individuals as to what is good or bad for society. Powerful and influential interests have long been able to steer civil legislation through the Congress to ultimate passage—all despite the presence of ulterior motives in doing so. It should be no surprise then to discover that our criminal laws have been enacted in a similar vein. Nowhere is this proposition more clear than in the area of legal drug control and enforcement.

How questionable drug legislation became enacted into law and why such laws have been allowed to stand despite the adverse effects they

have had on our society and its rule of law are not merely rhetorical questions. Indeed the answers to these questions and the insight they provide may be of assistance to both the legal and medical professionals. Thus it is that this writing is intended to provide the reader with an overview and analysis of only recently repealed or amended drug control laws, and to place controversial facts into their proper historical perspective. It is too much to hope that hardened opinions will be changed or modified but this writing may help to bridge the gap of misunderstanding which lies between embanked positions on the subject of legal drug control.

Overview of Prior Narcotic and Soft Drug Legislation

In retracing the development of drug control legislation¹⁷ in the United States, one might well begin with the Civil War for it was immediately prior thereto that our "drug problem" took root.

The invention of the hypodermic syringe in 1853 was a technological advance which enabled soldiers on both sides of the conflict to administer morphine for the relief of pain from battlefield wounds and dysentery. Addiction of soldiers as a result of their indiscriminate and imprudent use of morphine was so widespread that the problem was publicly referred to as the "soldiers' disease" or "army disease".¹⁸

A second factor alleged to have contributed to a developing drug addiction at that time was the importation of Chinese. Following the Civil War Chinese workers were imported to assist as cheap labor in the building of our nation's railroads.¹⁹ These Chinese are purported to have brought with them and introduced into our culture the practice of opium smoking. No doubt in partial response to this the City of San Francisco in 1882 passed an ordinance forbidding opium smoking under the threat of heavy penalty.²⁰ The State of New York is alleged to have followed suit directing its attention to opium smoking in New York City's Chinatown.²¹

16. This is not to say that laws are to be enacted in direct support of moral principles, nor primarily for moral purposes. It is to say, however, that they ought not to be immoral either facially or as applied.

17. There is little doubt in this author's mind that both nicotine and alcohol are potentially dangerous drugs. Nonetheless I do not intend to herein deal with them except insofar as laws controlling them and societal attitudes regarding those laws shed light on laws controlling the other so-called dangerous drugs, i.e., heroin, LSD, cocaine, marijuana, MDA, DMT, barbiturates, amphetamines, etc.

18. O. Ray, *Drugs, Society and Human Behavior* 18 (1972) [hereinafter cited as Ray].

19. *Id.* at 18.

20. H. H. Kane, *Opium Smoking in America and China* (1882.) Correspondence between the Author and the official custodian of records for the City and County of San Francisco has confirmed that such an ordinance was passed on June 11, 1903. There are no official records available for 1882, due no doubt to the great earthquake and fire. See San Francisco, Calif., Ordinance No. 798, June 11, 1903.

21. Ray, *supra* note 18, at 18.

By 1898, an advance in German chemistry resulted in the discovery of diacetyl morphine, commonly known as heroin.²² For a limited period of time heroin was thought to be a panacea for morphine addiction and it was medically prescribed as such.²³ The cure proved to be more painful than the illness.

Finally, the widespread legal distribution of patent medicines, dispensed by traveling peddlers, was an additional major factor which allegedly contributed to an increasing opium dependency problem in the United States.²⁴ Whether this is true or not remains a subject of debate but it is clear that the passage in 1906 of the Pure Food and Drug Act, which prohibited the interstate commerce of adulterated or misbranded drugs, was in response to a growing public concern over the use of patent medicines.²⁵

In 1909 the importation of opium, except for medicinal purposes, was declared illegal.²⁶ It is at this point in time that the fragmented and piecemeal approach on the federal level to drug control legislation finds its origin. Although designed to prevent opium smoking and its associated evils from taking root the act did not render it illegal to use or manufacture opium for non-medical use, but merely banned its importation. In fact, it was not until 1942, with the passage of the Opium Poppy Control Act, that there was a sound legal basis for controlling the cultivation of the Opium Poppy in the United States.²⁷

It is the firm opinion of one well-cited author in the field of drug addiction and law that public opinion and medical opinion had little to do with the formulation of our federal policy regarding the handling of drug problems. Rather, he argues:

"It is a program which, to all intents and purposes, was established by the decisions of administrative officials of the Treasury Department of the United States. After the crucial decisions had been made, public and medical support was sought and in large measure obtained for what was already an accomplished fact."²⁸

One has great difficulty in quarreling with Lindesmith's position regarding the role of administrative officials, particularly within the Treasury Department, with respect to shaping and administering drug laws. The earliest and most comprehensive federal law dealing with the subject of narcotic drugs, the Harrison Narcotic Act of 1914²⁹ was entitled as follows:

"An Act to provide for the registration of, with collectors of Internal Revenue, and to impose a special tax upon all persons who produce, import, manufacture, compound, deal in, dispense, sell, distribute or give away opium or coca leaves, their salts, derivatives or preparations and for other purposes."

Although the declared object of this law was to provide revenue its ostensible purpose appeared to be one of rendering the entire process of drug distribution within the United States a matter of record. Under the terms and provisions of the Harrison Act, all dealers and dispensers of narcotics (opium, cocaine and their derivatives) were required to register annually with the Internal Revenue. A nominal excise tax was collected by the Treasury Department on the transfer of any of the described drugs.³⁰ The Act as originally passed was not punitive in approach but was intended through its recordation provisions to limit addicts to lawful channels of distribution for their drugs. Nonetheless an illicit drug trade developed follow-

22. Brill, *Recurrent Patterns in the History of Drug Dependence and some Interpretations in Drugs and Youth* 18 (1969); C. Terry and M. Pellens, *The Opium Problem* 76 (1928).

23. See Terry and Pellens, *Id.* at 76-82.

24. Birney's Catarrh Cure contained 4% Cocaine while Laudanum contained 1 grain of opium for every 25 drops of alcohol. Ray, *supra* note 18, at 18. This provides a striking parallel to the much more dated "Golden's Liquid Beef Tonic" which in the 19th century was an oft recommended tonic treatment for alcoholism, despite the fact that it contained 53 proof ethyl alcohol.

25. The Food and Drugs Act of June 30, 1906, ch. 3915, 34 Stat. 768. It should be noted that the original Act was concerned with misbranding and required that the drug package state how much and what proportion of the stated drug, e.g., alcohol, was therein contained. It was not primarily concerned with the safety (toxicity) nor the effectiveness of the drug. These two aspects were formulated into law by amendments occurring 32 and 56 years later, respectively. See generally 21 U.S.C. §301-392.

26. Opium Import Control Act of 1909, ch. 100, 35 Stat. 614.

27. Opium Poppy Control Act of 1942, ch. 720, 56 Stat. 1045; since 1909 Congress has enacted more than 50 pieces of legislation relating to control of narcotics. See generally H.R. Rep. No. 91-1444, Sept. 10, 1970, 91st Cong. 2d Sess. (1970).

28. A. Lindesmith, *The Addict and The Law* 1 (1965).

29. Narcotic Drug Act of Dec. 17, 1914, ch. 1, 38 Stat. 785.

30. No doubt this tax was designed to make clear the fact that this law was a taxing measure. Serious doubt existed in 1914 concerning the constitutional power of the federal government to legislate in the area of drug control. Clearly under the 10th Amendment states possessed such a police power. *Whipple v. Martinson*, 256 U.S. 41 (1921). In order to avoid this question of constitutionality the law was premised on the power of the Congress "to lay and collect taxes," contained in Article 1, Section 8 of the U.S. Constitution. The sale provisions of the Harrison Act were constitutionally upheld in *United States v. Doremus*, 249 U.S. 86 (1919), because they had some relation to the raising of revenue; see also *Jin Fuey Moy v. United States*, 254 U.S. 189 (1920).

g passage of the Harrison Narcotic Act and is said to have resulted in a charge to the user of a narcotic drug fifty times in excess of the legal retail drug price.³¹

Unfortunately and regrettably, the passage of the Harrison Narcotic Act left the status of the addict in limbo; he was not specifically mentioned or dealt with. It did not take the addict long, however, to realize that his source of drugs was the black market. He was helped in this decision by the United States Supreme Court which by a series of decisions created an intolerable situation for addicts as well as for physicians treating addicts.

Shortly after passage of the Harrison Narcotic Act the U.S. Supreme Court held that an addict's possession of morphine sulphate, prescribed for him by a physician, did not constitute a conspiracy in violation of that law.³² However, after having encouraged the addict to turn to a physician for his drugs the Supreme Court then ruled³³ that a prescription of drugs for an addict "[N]ot in the course of professional treatment in the attempted cure of the habit, but being issued for the purpose of providing the user with morphine sufficient to keep him comfortable by maintaining his customary use" was not a prescription within the meaning of the law. In fact "[T]o call such an order for the use of morphine a physician's prescription would be so plain a perversion of meaning that no discussion of the subject is required."³⁴

Three years later in the case of *United States v. Behrman*,³⁵ the Supreme Court, over the dissents of Justices Holmes, Brandeis, and McReynolds, held in effect that a physician's good faith intention in prescribing drugs to an addict was immaterial in deciding whether or not a particular dosage was a permitted "prescription" under the terms of the Harrison Narcotic Act.

These decisions by the Supreme Court did more than deprive an addict of a legal source of drugs to ameliorate his pitiful condition—they also put an end to a unique experiment with ambulatory

drug clinics. In 1919 New York City opened the first such clinic and a favorable public attitude toward assisting the addict resulted in the opening of 43 more throughout the United States.³⁶ By 1923, due in no small part to the efforts of the federal narcotics authorities, all of these clinics were closed—done so without one critical analysis of the treatment methodology.³⁷

Coincidental with the Behrman decision in 1922, public opinion began to mold and to reflect administrative and judicial attitudes toward the addict. Thus it was that the Jones-Miller Act of 1922,³⁸ which more than doubled the maximum penalties for dealing in imported narcotics was warmly received and, in fact, demanded by the public. "The addict was no longer a victim, but a threat, a transformation that took but four years to accomplish."³⁹

Ironical as it must have been, the Supreme Court, three years later, in *Linder v. United States*⁴⁰ took a critical turn in its approach to medical issues arising under the Harrison Act. For the first time the Court seriously questioned the wisdom and the constitutionality of its prior practice of applying the provisions of the Harrison Narcotic Act in rigid fashion to situations involving the prescription of drugs by physicians to addicts for the purpose of relieving conditions incident to addiction. In terms of impact, the Linder opinion involved much more than a seeming retreat from the Court's earlier decisions in *Webb* and *Behrman*. Indeed, the Court in *Linder* made explicit the fact that, "Obviously, direct control of medical practice in the states is beyond the power of the Federal Government."⁴¹ Significantly, based on this premise, the Court reasoned that because "[A]ddicts are diseased and proper subjects for such [medical] treatment," the Court could not possibly conclude that a physician acted improperly or unwisely or for other than medical purposes solely because he has dispensed to one of them, in the ordinary course and in good faith, four small tablets of morphine or cocaine for relief of condi-

31. Ray, *supra* note 18, at 20.

32. *Jin Fuey Moy v. United States*, 241 U.S. 395 (1915).

33. *Webb v. United States*, 249 U.S. 96 (1919).

34. *Id.* at 99. Query: Has the court invaded the province of the medical profession in making such bold assertions?

35. 258 U.S. 280. (1922).

36. R. Smith, *U.S. Marijuana Legislation and the Creation of a Social Problem in The New Social Drug* 108 (D. Smith ed. 1970).

37. *Id.* at 108.

38. Jones-Miller Act, ch. 202, 42 Stat. 596 (1922). This act also created the Federal Narcotics Control Board composed of the Secretaries of State, Treasury, and Commerce.

39. Smith, *supra* note 36, at 108.

40. 268 U.S. 5 (1925).

41. *Id.* at 18.

tions incident to addiction.⁴²

Linder remains good law⁴³ though it has been argued that in years subsequent to the decision few physicians relied on it—largely owing to a fear of playing “Russian Roulette” with the law. Their fear was not unwarranted for as late as 1936 the U.S. Treasury Department continued to maintain regulations purporting to instruct physicians as to when they may and may not prescribe drugs for addicts.⁴⁴ An additional factor which may have served to hamper the medical profession with respect to prescribing drugs for addicts is the fact that even after Linder the Courts retain the right to pass upon the question of a physician’s “good faith”, and this provides the medical profession with something less than complete certainty in the matter.

Until 1970 the Harrison Narcotic Act of 1914, as amended, remained the basic narcotic control measure. It has been amended numerous times but two are worthy of mention: The 1951 Boggs Amendments⁴⁵ and the Narcotic Control Act of 1956.⁴⁶ These statutes are further examples of a harsh and extreme legal approach to the problem of drug use and addiction. In reaction to what was viewed as an increasing addiction problem during the period 1948-51, these laws collectively imposed harsher penalties, virtually eliminated the possibility of unlawful probation for convicted drug offenders and (except for first offenses of possession) provided for mandatory minimum sentences upon conviction. As a practical result of the passage of these amendments judicial power and discretion were transferred to the police and prosecutors. *All* convicted sellers or distributors of narcotics were to be jailed or imprisoned. The possibility of overkill was at its height!

It was not until 1965 that the federal government regulated for the first time by statute, the possession or sale of “soft” drugs, e.g. barbiturates, amphetamines and Lysergic Acid Diethylamide (LSD). With the passage of the Drug Abuse Control Amendments of 1965,⁴⁷ barbitur-

ates, amphetamines and hallucinogens were brought under federal statutory control.

Whatever the reason for prior non-action with respect to these drugs may have been it is clear that there was a visible attitudinal change on the part of the U.S. Congress in 1965. This legislative enactment was devoid of the punitive tone and seemingly harsh approach to the drug problem which earlier federal narcotics and marihuana laws had possessed. Penalties for violation of the possession and sale provisions of this Act were in sharp contrast to those provided for violation of the oft-amended Harrison Act. For example, in 1965 the maximum penalty upon conviction of unlawful possession of amphetamine was one year imprisonment or a fine of \$1000 or both; probation and parole were also made available to the defendant.

There are several explanations for this differing legislative approach toward the sale or possession of these drugs. The distribution of amphetamines to soldiers during World War II and during the Korean conflict for the ostensible purpose of reducing fatigue and increasing alertness provides an analogue to the distribution and availability of morphine during the Civil War. The widespread use of amphetamines during the 1950’s by truck drivers, housewives, students, and others would seem to have pointed the way toward concern. Yet as late as 1963 the American Medical Association’s Council on Drugs stated: “At this time, compulsive abuse of the amphetamines (is) a small problem . . .”⁴⁸ Perhaps this is but another way of saying that rulemakers did not officially disapprove of amphetamine use until it became a cultural problem, i.e., the use of “speed” and other such drugs became associated with the rebellious youth movement and counterculture. Certainly, as one well versed author in the drug field has pointed out, laws against drug use provide a convenient device for attacking youth and stifling dissent and non-conformity.⁴⁹

The foregoing constitutes a nutshell overview

42. *Id.* at 18.

43. On a more recent note but in a slightly different vein the United States Supreme Court has held that a California statute that made it a misdemeanor to be addicted to narcotics constituted (by virtue of conviction) cruel and unusual punishment in violation of the 14th Amendment *Robinson v. California* 370 U.S. 660, (1962). For a different result with respect to alcohol addiction see *Powell v. Texas* 392 U.S. 514 (1968), reh. denied 393 US898 (1968).

44. *cf.* *U.S. v. Anthony*, 15 F. Supp. 553 (1936).

45. Boggs Act of November 2, 1951, ch. 666, 65 Stat. 767.

46. Narcotic Control Act of 1956, ch. 629, 70 Stat. 567.

47. Pub. L. 89-74, July 15, 1965, 79 Stat. 226.

48. Ray, *supra* note 18, at 164.

49. J. Fort, *Social Problems of Drug Use and Drug Policies* 7, Document of Office of Education, United States Department of Health, Education and Welfare (1968).

f the legislative history, on the federal level, of our narcotics and soft drug control laws. These laws were criminal in nature, all were thought to be responsive to the immediate problem and all were vigorously applied and enforced. Nonetheless, it should be noted that, during the period of their passage and following, drug use and dependency steadily and rapidly increased.

If the purpose of a criminal law is to deter the proscribed conduct then apparently narcotics and "soft" drug laws have failed in achieving that objective. If, on the other hand, the real purpose of a criminal law is to mete out punishment for having engaged in proscribed conduct then the narcotics laws have certainly been successful and effective. Jurisprudentially, however, and in either event, one of the primary purposes of a criminal law ought to be to protect society from forms of behavior which have been determined to be harmful and inimicable to the interests of society and its individual members. Has such harm been sufficiently demonstrated at the threshold point, i.e., before the Congress and the legislatures, or, at a later judicial point, with respect to: a) addiction; or b) simple and voluntary use for personal pleasure of any of the narcotic drugs or the dependency producing substances discussed thus far?

This question is not easy to answer, particularly because of the difficulties one encounters in attempting to sort and evaluate past actions and events. It is clear, however, that the legislative process through which our drug control legislation has developed was something less than desirable with respect to basic analysis of these laws prior to passage. A sound analysis, it would seem, would have required that less reliance be placed on the testimony and statements of those about to be charged with enforcing a given law and more inquiry be made into the question of whether there should be such a law in the first place.

On the other hand, it is extremely difficult to conclude that the legislative judgment with respect to drug control and the need for the same was altogether faulty. We know, for example, that heroin has ruined many a life and a family during this 20th century. We see the ravages of crime being attributed on a daily basis to the need of drug addicts to obtain money in order to purchase dependency producing drugs. There are many ad-

dicts in our society and it is fair to infer that there would be many more were it not for criminal laws.

Yet in the area of drug control, even these facts beg the question as to whether there should be criminal restraints in the first instance. Once the judicial imposition of criminal status has taken place, the unwilling recipient discovers that such a status carries with it or attracts to it a host of social problems and disabilities. Faced with this, the future conduct of such an individual is often predictable; in this sense crime will beget crime. The responsibility for setting in motion such a chain of events is thus a serious one and should be discharged accordingly. Unfortunately, there are crimes which have been rashly created by legislative bodies and in the end our entire society has suffered for it. Indeed, there are few areas of the law which have as urgent a need for a total re-examination and inquiry into the basic legislative wisdom in creating criminal restraints as the "other one-half" of our drug control, marihuana laws.

"A rose by any other name . . ."

The recurring theme that legislatures have heard little if any medical, sociological or scientific testimony before enacting drug control legislation⁵⁰ certainly is valid with respect to marihuana legislation, both state and federal. Cannabis Sativa, also known variously as marihuana, Indian Hemp, kif, ganga, maconha, dagga, bhang, charaas and hashish, grows in most of the countries of the world, including all those in the Western hemisphere, Africa, the entire continent of Asia, Australia and the Indonesian archipelago. A few scattered varieties may be found in Europe. Although there are botanical affinities between the various subspecies of cannabis sativa, the amount of psychoactive components in the plant varies widely.⁵¹

Marihuana has long been used for medical and religious purposes. Indeed, it is claimed to have played a medical role in every country in which it has grown.⁵² Cannabis is presently used in Arabic and Indian medicine, and in the United Kingdom it may be prescribed by doctors in the form of an extract or tincture of cannabis.⁵³ Medical use of cannabis is mentioned as early as 2737 BC when it was recommended in China by Shen

50. *Id.* at 3.

51. HEW, Marijuana and Health, A Report to the Congress From the Secretary 44, Jan. 31, 1971.

52. *Id.* at 44.

53. Marijuana and Health, *supra* note 51, at 44.

Nung, physician, for female weaknesses, beriberi, constipation, absent-mindedness and surgical anesthesia. It was also used medically in India before 1000 B.C.⁵⁴

It is thought that cannabis (in the form of the hemp plant) was introduced into the United States by the early English colonists.⁵⁵ Cultivation of the cannabis plant for its fibrous content is said to have been simultaneous with the founding of the early American colonies.⁵⁶ Hemp fiber was the source not only of rope which was to find its way into the riggings of many ocean sailing ships but also of the rough fabric which covered westward-bound American pioneer wagons. Despite the fact that hemp farming was an accepted, respectable occupation, the second half of the nineteenth century witnessed a decline in the use of hemp rope and canvas. Paper industries and birdseed manufacturers found uses for hemp which shortly took up the slack, however.⁵⁷ The 19th century British botanist Gilbert Burnett is said to have noted that the seed of the hemp is very nutritious and "[c]hanges the color of the plumage of bullfinches and goldfinches."⁵⁸

From colonial times until at least the second decade of the present century, cannabis was used medicinally in the United States in the treatment of a variety of illnesses.⁵⁹ Between 1839 and 1900 more than 100 articles appeared in scientific journals describing the medical properties of this plant.⁶⁰

The introduction of injectable opiates in the latter half of the nineteenth century and of specific synthetic analgesics and hypnotics in the first decades of the twentieth century may have had some effect on the decline in the use of cannabis as a medicine.⁶¹ Nonetheless at the time of passage of the Marihuana Tax Act in 1937⁶² twenty-eight legal cannabis preparations remained to be withdrawn from the market.⁶³

During the beginning of the twentieth century public interest and concern about the use of mari-

huana as an intoxicant was limited. The reasons for this are probably twofold. Firstly, it is generally assumed that the smoking of marihuana was confined to Mexican workers residing in the southwestern portion of the United States. As long as the problem was confined to "that group of people" there was little need to be aroused from a legal and societal standpoint. Secondly it is important to recognize that in 1900 only a handful of states regulated traffic in narcotic drugs—opium, morphine and heroin—even though proportionately more persons were believed addicted to those drugs at that time than at any other time since.⁶⁴ Contributing to this state of affairs is the demonstrable fact of a lack of definitive public policy at the federal level on the subject of controlling addiction. Thus in terms of state and federal legislative priorities the problem of the use of addicting drugs by the general public in the early years of the twentieth century was certainly foremost in the eyes of legislators; concern about marihuana was to wait its turn.

The passage of the Harrison Narcotic Act⁶⁵ in 1914 not only established a new federal policy with respect to narcotics but also saw the implantation legislatively of fallacious seeds of reasoning which were to come to fruition in the 30's. Specifically it should be noted that during the period of time prior to passage of the Harrison Narcotic Act the Temperance Movement was actively and publicly espousing its principles. Despite the fact that this movement had for a long time been concerned only with the use of alcohol and nicotine, many of its premises were applicable "in spades" to the use of narcotic drugs. Use of narcotic drugs came to be seen as an immoral act deserving of eradication. Use of narcotics, it was thought, automatically escalated to dependence and excess, which in turn led to pauperism, crime and insanity.⁶⁶ Sociologically, narcotics use was seen to be prevalent among slothful and immoral populations such as gamblers, prostitutes and oth-

54. Marijuana and Health, *supra* note 51 at 84; Ray, *supra* note 18 at 258.

55. In fact it is claimed that the first American crop of Indian Hemp was planted in 1611 near Jamestown, Virginia. Marijuana and Health, *supra* note 51, at 52; L. Grinspoon, Marijuana Reconsidered 11 (1971) [hereinafter cited as Grinspoon].

56. Grinspoon, *supra* note 55, at 10.

57. *Id.*

58. W. Oursler, Marijuana—The Facts—The Truth 70 (1968).

59. Marijuana and Health, *supra* note 51, at 44.

60. Grinspoon, *supra* note 55, at 13.

61. Grinspoon, *supra* note 55, at 14.

62. Marihuana Tax Act of 1937, ch. 553, 50 Stat. 551.

63. In 1941 Cannabis was dropped from the National Formulary and the U.S. Pharmacopeia, non-governmental compilations of the best available drugs.

64. Marijuana—A Signal of Misunderstanding, The Official Report of the National Commission on Marijuana and Drug Abuse 14 (Signet ed. 1972) [hereinafter cited as Marijuana Commission Report].

65. Narcotic Drug Act of Dec. 17, 1914, ch. 1, 38 Stat. 785.

66. Marijuana Commission Report, *supra* note 64, at 15.

er undesirables. These attitudes, expressed so strongly prior to the passage of state and federal narcotics legislation, played no small role in the later passage of marihuana legislation.

Certainly both the extent and amount of use of marihuana as an intoxicant played a role in determining the timing of anti-marihuana legislation, both state and federal. New Orleans was one of the first major cities in the United States to encounter "the problem". Sometime between 1910 and 1920 jazz musicians, particularly drummers, are alleged to have begun actively using the drug, and in joyous displays of friendship, to have shared it with their friends. From this port city, dried plant leaves were shipped up the Mississippi to various river ports and from there cross-country to large cities.⁶⁷ Although by 1930 marihuana smoking was popular with blacks and other minority groups it did not enjoy widespread use and acceptance by the dominant white middle class culture groups. This combination of use by minority groups only and an apparent nonconcern on the part of the general public resulted in the lack of a definitive public policy on the matter.

Notwithstanding this lack of public concern about marihuana and its use, by 1931 twenty-one states had managed to restrict the sale of marihuana as part of their general narcotics statutes, one state had prohibited its use for any purpose and four states had outlawed its cultivation.⁶⁸ Standing alone this regulation is somewhat misleading. In fact, it is strongly contended that in those states which had passed such laws there was little, if any, evidence of public concern which could be cited in support of them.⁶⁹ The explanation for this apparent anomaly is furnished by two authors in the field who assert, with some merit, that state anti-marihuana legislation in the Western half of the United States was motivated primarily by ethnic considerations⁷⁰ and in the Eastern half of the United States by fears of substitution.⁷¹ Indeed they con-

cluded from their research that prior to passage of anti-marihuana legislation no state had undertaken "[a]ny empirical or scientific study of the effects of the drug. Instead they relied on lurid and often unfounded accounts of marihuana's dangers as presented in what little newspaper coverage the drug received."⁷² This conclusion is further supported by the National Commission on Marijuana and Drug Abuse which made the following statement:

"Not once during this entire period [prior to 1937] was any comprehensive study undertaken in this country of marijuana or its effects. The drug was assumed to be a 'narcotic', to render the user psychologically dependent, to provoke violent crime, and to cause insanity. Although media attention was attracted to marijuana use around 1935, public awareness was low and public debate non-existent."⁷³

In light of the foregoing one might ask how it was that the Conference of Commissioners on Uniform State Laws could in 1932 promulgate a model act under the terms of which marihuana was optionally classified as a narcotic and its sale or possession prohibited and punished as severely as that of other narcotics, and further, that the federal government could, in 1937, pass with little debate the Marihuana Tax Act which, as amended, provided punishments equivalent to those provided under the Harrison Narcotic Act for the unlawful sale or possession of opium, cocaine and their derivatives. It serves one well at this juncture to consider seriously the charge that a small group of individuals through its zealous and vigorous efforts was largely responsible for these repressive marihuana laws. That small group is alleged to have been Harry Anslinger, Commissioner of the Federal Bureau of Narcotics, and his fellow employee-agents.

In 1930 enforcement of the narcotics laws was vested in the Federal Bureau of Narcotics, headed by Commissioner Anslinger.⁷⁴ Many of these narcotics agents were former prohibition agents who had little knowledge about narcotics,

67. Grinspoon, *supra* note 55, at 15.

68. Bonnie and Whitebread II, *The Forbidden Fruit and the Tree of Knowledge: An Inquiry Into the Legal History of Marijuana Prohibition*, 56 Va.L. Rev. 1010 (1970) [hereinafter cited as Bonnie and Whitebread].

69. *Id.* at 1011.

70. Specifically, the states of Utah, New Mexico, Texas, Montana and Colorado are alleged to have engaged themselves in "class legislation" directed against Mexicans. Bonnie and Whitebread, *supra* note 68, at 1014.

71. It is theorized that marijuana use had to be prohibited to prevent addicts from switching to it as a substitute for the drugs which had become more difficult to obtain after the passage of the Harrison and Volstead Acts. Bonnie and Whitebread, *supra* note 68, at 1019.

72. Bonnie and Whitebread, *supra* note 68, at 1021-22.

73. Marijuana Commission Report, *supra* note 64, at 16.

74. Act of June 14, 1930, ch. 488, 46 Stat. 585. It is claimed that this agency was the single primary factor influencing the course of drug regulation in the United States from 1930 to 1970. See generally King, *The Narcotics Bureau and The Harrison Act*, 62 Yale L.J. 736 (1953).

and less about marihuana. It is a fact of history that Harry Anslinger waged a virtual one-man war for over 32 years, from his powerful position as Commissioner, against the sale or use of marihuana. The tone of his attack is best exemplified by the following statement made by him just prior to passage of the Marihuana Tax Act in 1937:

"How many murders, suicides, robberies, criminal assaults, hold-ups, burglaries, and deeds of maniacal insanity it [marijuana] causes each year, especially among the young, can only be conjectural.⁷⁵"

The Uniform Narcotic Drug Act was a relatively non-controversial act at the time of its adoption in 1932 by the Commissioners on Uniform State Laws. It was drafted in conjunction with the advice and input of the American Medical Association⁷⁶ and after 1930, Commissioner Anslinger. By 1937, all of the states had some form of marihuana legislation. Thirty-five states had adopted this uniform act⁷⁷ and nearly all of those states had included the optional marihuana provision despite the lack of any scientific undertaking by the Commissioners on this subject. Although it is claimed that the Federal Bureau of Narcotics lobbied in each state legislature to insure the passage of marihuana legislation on the local level, it is cautioned that due to the firming public attitude toward narcotics in general that such legislation would probably have been adopted despite the Bureau's efforts.⁷⁸

The Federal Bureau of Narcotics did not confine its efforts to assisting state legislatures in the passage of anti-marihuana laws. Indeed its involvement at the federal level both prior and subsequent to the passage of the Marihuana Tax Act is quite remarkable.⁷⁹ This involvement was considered by the Bureau to be necessary because

of the serious nature of the problem. The primary task of the Bureau appeared to be one of educating the public and the legislators concerning the dangers of marihuana. Fortunately, history and scientific research have disproven and dispelled as myths many of the facts and beliefs enunciated and pronounced under the guise of education by the Bureau in the 30's. Nonetheless the amount and type of information disseminated by the Bureau is in large part responsible for the defensive posture in which marihuana finds itself today.

The passage of the Marihuana Tax Act can be characterized as an unwarranted abdication and delegation of legislative responsibility by the Congress to the Federal Bureau of Narcotics and the Treasury Department. Legislative action was instituted on April 14, 1937 by the introduction of HR 6385 in the House of Representatives. Hearings on the bill before the House Ways and Means Committee began on April 27, 1937. These hearings lasted five days during which time 12 witnesses appeared. Three of these witnesses represented the birdseed industry and had appeared to express their concern that they be permitted to use hempseed as a form of birdseed.⁸⁰ Four of these witnesses represented the Treasury Department in one capacity or another and spent their time before the Committee explaining the tax features of the proposed law.⁸¹ The remaining witnesses provided little testimony on the medical, social or scientific aspects surrounding the use of cannabis. In fact the one witness who questioned this deficiency, Dr. William Woodward, representing the American Medical Association, was accused of obstructionism and bad faith.⁸² Woodward, to his credit, had the audacity to question the competency of the medical evidence regarding cannabis which had

75. Anslinger, Harry J. with Courtney Cooper, "Assassin of Youth", *The American Magazine*, at 18, Vol. 124, (July, 1937).

76. Dr. William C. Woodward, Executive Secretary of the Bureau of Legal Medicine and Legislation of the American Medical Association, who was later to become an outspoken critic of the Marihuana Tax Act, prepared and submitted the first tentative draft of the Uniform Narcotic Drug Act at the 1925 meeting of the Commissioners. See Bonnie and Whitebread, *supra* note 68, at 1030.

77. Minnesota adopted the Uniform Narcotic Drug Act in 1937, as Ch. 74, Minn. Stat. 618.01-05. Marijuana was defined as a narcotic and its unlawful sale or possession punishable as a felony by imprisonment from 5 to 20 years or a fine of not more than \$10,000 or both. This statute was repealed in 1971 by Minn. Laws Ch. 937, Minn. Stat. 152.01 et. seq.

78. Bonnie and Whitebread, *supra* note 68, at 1034.

79. During the period July 1937, to June, 1939, 17 articles were published condemning cannabis. Of these, ten articles acknowledged explicitly or implicitly the help given by the FBN in furnishing facts and figures. See H. Becker, *Outsiders: Studies in the Sociology of Deviance*, 14 (1953).

80. An agreement was reached whereby birdseed would be sterilized with heat before being placed on the market for sale. Hearings on H.R.6385 before the Committee on Ways and Means, 75th Cong. 1st Sess. 74 (1937) [hereinafter cited as Tax Act Hearing].

81. The Marihuana Tax Act was also passed under the guise of a revenue producing measure. See note 30, *supra*.

82. Tax Act Hearing, *supra* note 80, at 116.

been presented to the House Committee.⁸³

If the Committee hearings were deficient from a legislative standpoint, then certainly the action of the House of Representatives in passing the Committee bill was even more so. With little debate the Act passed without a roll call vote.⁸⁴

Proceedings in the Senate on this Tax Act were even less protracted. Hearing from a total of seven witnesses, five of whom represented the hemp seed industry, the Senate Committee deliberated less than two hours on the matter! On August 2, 1937 the Marihuana Tax Act was signed into law and it took legal effect on October 1, 1937. Thus this important piece of federal legislation finds its genesis in conduct and deliberations of the Congress which might easily be considered reprehensible from a legislative point of view and unworthy of public respect.

The Boggs Amendments and the Narcotic Control Act of 1956 not only dealt with the unlawful sale or possession of narcotic drugs; these Acts also served to increase the penalties provided for upon conviction of unlawful sale or possession of marihuana.

In 1951, for the first time on the federal level, marihuana was lumped together with the other prohibited narcotics and uniform penalties were provided for violators of the Narcotic Drugs Import and Export Act⁸⁵ or the Marihuana Tax Act.⁸⁶ The Narcotic Control Act of 1956 followed suit when it increased penalties for the unlawful sale or possession of narcotics. These legislative actions are generally believed to have been premised on an increasing public belief that the use of marihuana led to the use of more dangerous drugs, i.e., the stepping-stone theory. Unfortunately for many, this Draconian legal approach of actively prosecuting marihuana violations and seeking to impose severe sentences upon convicted marihuana offenders, particularly sellers, remained the law of the land until 1970.⁸⁷

If You Will Permit Me To Opine

Certain facts about the historical development of our drug legislation give this author cause for concern. Why was it, for example, that the remarkable report of the Indian Hemp Drug Commission of 1893-94 which "[D]espite its antiquity and relative obscurity . . . remains in all probability the most complete and well-balanced treatment of marijuana (and cannabis, or hemp, drugs generally) in existence"⁸⁸ has been all but ignored by virtually every legislative body and court which has dealt with the subject of marihuana. In contrast with the House and Senate antics of 1937 this Commission heard from 1,193 witnesses, 335 of whom were medical practitioners.⁸⁹ Perhaps the answer lies in the fact that the report and its six volumes of appendices totalling 3,000 pages, constitute much too much reading for any one legislator. Granting such reading difficulties, however, such an omission, although understandable, is not excusable, particularly when it is a criminal law which is undergoing legislative consideration.

The Indian Hemp Commission report does not stand alone. Also totally overlooked by legislators (or at least when it came to making their decision) was a study done from 1931 to 1933 by the United States Army regarding the use of marihuana by soldiers stationed in the Panama Canal Zone⁹⁰ and another done during the period 1939 to 1944 by a 15-man committee, which consisted of two Ph.D.'s and thirteen M.D.'s appointed by former New York City Mayor Fiorello La Guardia.⁹¹ Taken together these studies fairly conclude that the smoking of marihuana does not lead to aggressive or anti-social behavior nor does it cause sexual overstimulation or lead to the commission of serious crime—a refutation of the continuing myths perpetuated by the Federal Bureau of Narcotics and Commissioner Harry Anslinger in particular.

83. *Id.* at 92.

84. A statement detailing examples of lurid crimes which had been furnished to the Ways and Means Committee was read to the members of the House with little adverse comment. See generally Bonnie and Whitebread, *supra* note 68 at 1061 and 81 Cong. Rec. 5689-92 (1937).

85. Ch. 202, 42 Stat 596 (1922).

86. Ch. 553, 50 Stat. 551 (1937).

87. The impact of *Leary v. United States*, 395 U.S. 6 (1969), which held that to require buyers of marijuana to register, file a written order form and to pay a transfer tax was in violation of an individual's 5th Amendment protection against self-incrimination, was softened by subsequent cases. See *Minor v. United States*, 396 U.S. 87 (1969) (fifth amendment not applicable to provision requiring marijuana sellers to sell only to those who have furnished an order form) and *U.S. v. Young*, 422 F. 2d 302 (8th Cir. 1970), cert. denied, 398 U.S. 914 (1970) (conviction under Marihuana Tax Act for interstate transportation of marijuana does not violate the 5th Amendment).

88. J. Kaplan, *Marijuana, The New Prohibition*, 115 (1970).

89. See generally Kittrie, *Marijuana, The Right to Truth*, 23 So. Carol. L. Rev. 361-370 (1971).

90. This study concluded that marijuana was a relatively harmless drug and it did not cause maladjustment in the user. See *Marijuana Smoking in Panama*, 73 *The Military Surgeon* 269 (1933).

91. The committee's report "The Marijuana Problem in the City of New York" (Jaques Cattell Press, 1945), minimized the dangers of marijuana.

Perhaps framing my concern in a more direct fashion will be of some value: Why were these reports and others on the subject consistently ignored during the period of time that marihuana and its sale, use and possession were increasingly criminalized? The answer to this question might well create cause for concern about our legislative treatment of the other drugs as well.

It is this author's firming opinion that our professions, the medical and legal, might well consider the possibility that our professional input into this broad area of drug use, dependency and control may have something to do with "the problem" itself. Not only does our contribution and performance in this field appear in retrospect to have been decidedly biased but indeed our minimal input appears in the main to represent little more than an amplification of the majority values of the culture and society in which we find ourselves. In short, our failure to exercise an objective and professional approach to the drug problem—one which is not only bias-free but meaningful as well—must be seen as one important reason why we find ourselves as we do today with widespread youthful disrespect for our system of law, distrust of professional opinion and a highly questionable legal infrastructure for the control of drugs of abuse.

If examples in support of the foregoing assertions are needed they abound. The major organ of the American Medical Association for the presentation of scientific papers as well as its editorial policy is the *Journal of the American Medical Association (JAMA)*. That journal has consistently taken a biased position regarding marihuana not only in its policy statements but also in the papers it selects and rejects for publication.⁹²

As early as 1933 JAMA was sufficiently informed to state in response to a query from a medical practitioner: "[T]hat [marijuana] smokers nearly always become imbecile in time" and that "[I]t must be admitted that 'marijuana' . . . may cause dementia."⁹³

Following publication of the *La Guardia Com-*

mission Report the JAMA editorialized in 1945 as follows:

"The book states unqualifiedly to the public that the use of this narcotic does not lead to physical, mental or moral degeneration and that permanent deleterious effects from its continued use were not observed on 77 prisoners. This statement has already done great damage to the cause of law enforcement. Public officials will do well to disregard this unscientific, uncritical study and continue to regard marijuana as a menace whenever it is purveyed."⁹⁴

Individual efforts as well as official organizations support the proposition that the medical profession in general bears some responsibility for the amount of misinformation concerning drugs which has been disseminated and perpetuated from one generation to the next. For example in 1951 when the Boggs Act was being considered before Congressional Committees, individual medical practitioners supported, by their testimony, police assertions that there was a link between marihuana use and ultimate heroin addiction.⁹⁵

In 1971 the President-elect of the AMA was widely quoted to the effect that the Association had evidence that the use of marihuana not only caused birth defects but impotence as well. "Although he later admitted that he knew of no such evidence he said that he had allowed the misrepresentation to stand because he wished to discourage marihuana use."⁹⁶ When asked about the loss of credibility among the young caused by this type of authoritative misrepresentation the President-elect is alleged to have responded: "I'm tired of these phrases about credibility gap and such. We're talking about the morality of our country and the loss of respect of law and order and authority and decency."⁹⁷

Such public expressions of opinion, particularly on the subject of marihuana, may some day come to haunt the medical profession. Many medical students, for example, have a differing attitude concerning marihuana. In a reported survey of 1,057 medical students by the Association of American Medical Colleges it was

92. Grinspoon, *supra* note 55, at 329. This author, an M.D., recites as factual the rejection for publication of the well-publicized Crancer Study which dealt with the effects of marijuana on one's ability to adequately operate a motor vehicle (cannabis significantly less dangerous than alcohol in this respect) while at the same time accepting for publication three papers negative towards the use of marijuana.

93. 100 JAMA 601 (1933).

94. 127 JAMA 1129 (1945).

95. Hearings Before the Special Senate Committee to Investigate Organized Crime in Interstate Commerce, 82nd Cong. 1st Sess., pt. 14, at 133 and 143 (1951).

96. See Kaplan, *The Role of the Law in Drug Control*, 71 Duke L.J. 1065, at 1097, citing McCabe, "Clamor in the AMA," *San Francisco Chronicle*, April 7, 1971, at 51.

97. Kaplan, *Id.* citing, *San Jose Mercury*, March 25, 1971, at 17, col. 1.

revealed that 30% were currently using the drug.⁹⁸ Comments indicated those who had used the drug the most (over 100 times) were sure it was not harmful.

In particular, the students indicated they were not paying attention to publications which say the drug is dangerous, including those of committees of the American Medical Association or the National Research Council. In fact, the students were willing to indicate that they relied on the opinions of their friends in making a decision to use this drug.⁹⁹

The position of the organized legal profession concerning drugs and the need for drug control legislation has in the main been premised on the same misunderstandings and biased attitudes as have in the past permeated the medical profession. One can account for this by recognizing, that lawyers too, in the public expression of their opinions, have all too often only mirrored prevailing societal attitudes and prejudices, which in many instances are the antithesis of informed objective opinions. This has occurred despite the fact that lawyers are intimately involved in the prosecution and defense of drug law violations and ought to be in an excellent position to evaluate such laws in terms of their fairness, efficacy, deterrent effect and value in general. In partial defense of the legal profession, however, it must be said that lawyers, particularly lawyer-legislators, are prone to defer to and rely on the informed judgment of their professional medical brethren. It would set dangerous precedent were lawyers encouraged to exercise their independent judgment on matters which, at least after 1925, are considered legitimate, but not exclusive, matters of medical concern.

In further (but not hostile) indictment of my fellow brethren let me take pains to point out that a resolution introduced at the 1972 Annual Meeting of the American Bar Association, in which it was proposed that the ABA go on record in favor of the repeal of laws punishing the personal use of marihuana, caused extensive and heated debate.¹⁰⁰ The stated proposition that use of marihuana does not lead to the use of

narcotics was denounced by a lawyer from Texas as "just pure buncombe."¹⁰¹ All of which is to say that although legitimate and honest factual debate continues over the use of marihuana, and other drugs for that matter, the inflammatory and emotional rhetoric of the 30's remains with us today.

Further Food for Thought

One strongly suspects that organized medicine considers use of an illegal drug as "drug abuse" (the legal profession certainly does) thereby in a certain sense creating problems both for themselves and the legal profession. Certainly at a minimum such a definition constitutes a gratuitous extension of the jurisdiction of the medical profession into an area commonly denoted as legal in nature, i.e., the enactment of legislation defining criminal conduct—the converse of the uncomfortable position in which our United States Supreme Court found itself in the early 1920's when it was defining by decision what constituted legitimate medical practice.

If the medical and legal professions are to be of any assistance whatever to each other with respect to defining drug abuse and rendering meaningful recommendations for its legal control it would seem elementary that both first recognize the perimeters of their jurisdictions and thus their professional responsibilities, and guide their actions accordingly. In mitigation of these implied charges, it must be conceded that the subject of drug abuse is only one among a number of subjects which can be said to be of mutual concern to both professions and thus inviting of jurisdictional tangles.¹⁰² Such a concession, however, must not be allowed to obfuscate the real issue involved and it bears restating, to wit, whether each profession has exhibited and conducted itself with regard to a sensitive issue in a manner which is directly and primarily responsive to the legitimate concerns of that profession as opposed to the values and concerns held by the public in general.

More than ever before it is incumbent upon the numbers of our professions to assert them-

98. W. Alvarez, M.D., *Use of Pot Considered*, Minneapolis Star, March 12, 1971 at 4B, cols. 5, 6 and 7.

99. *Id.*

100. *Marijuana and Citizens Suits on Environment are Hotly Debated by House of Delegates in San Francisco*, 58 A.B.A.J. 1073 (1972).

101. *Id.* at 1074.

102. The definition of insanity has long plagued legal and medical scholars alike. Mutual cooperation is made all the more necessitous owing to the seriousness of the topic. For an example of an urgent plea for mutual cooperation, See S. Glueck, *Law and Psychiatry: Cold War or Entente Cordiale?* (1965).

selves and take unpopular stands when the facts warrant them. The fact of controversy within our professions as well as the merits of the respective conflicting positions should be freely and publicly aired, for it is only when we have a well informed public that we are able to lend any weight to their nonprofessional opinion, regardless of the subject matter.

It would seem that a condition precedent to informing the public is informing ourselves and being honest and candid in doing so. To disclaim any bias or prejudice on our part, for example, with respect to the topics of heroin and marihuana use, is to deny the fact that each of us is to some extent the product of our environment and subject to existing societal attitudes and pressures. Once recognizing this, certain steps can be responsibly taken. At a minimum we can, if we wish, lend some credence to our professional opinions by taking the neces-

sary time to adequately educate ourselves on the broad subject of drugs and their use. Ideally one might become immersed in the subject and emerge as an informed leader in this developing field of medical practice. In any event, to be meaningful, the educational process and inquiry must of necessity be factual in nature and grounded in academia—not police publications. Education of students on the subject of drugs and the effects of their use must truly be pedagogical in nature. Only then will public expression of medical and legal opinion in this highly controversial area of drugs, drug abuse and drug control begin to earn a respect, which though publicly accorded in the past, was for the most part undeserved.

There are those who will say that this autopsy and the opinions herein rendered are neither complete nor scientifically sound. To them I commend the body for further examination.

The Clinical Allergist and Immunologist

The Department of Medicine of the University of Minnesota Medical School announces a continuing medical education program entitled "The Clinical Allergist and Immunologist" to be held April 5-7, 1973 in the Nolte Center for Continuing Education on the Minneapolis campus. The program is presented by the Office of Postgraduate Medical Education.

This course is designed as an up-to-date survey of clinical allergy and immunology. Emphasis will be placed on the practical features of doing a sound allergic and immunologic work-up as well as treating patients in a safe and medically acceptable fashion.

In addition to lectures, demonstrations and question periods, practical workshops will be conducted on presclected topics by the members of the faculty.

Fee: \$100.00.

Further information may be obtained from the Office of Postgraduate Medical Education, University of Minnesota, Room 205, Nolte Center for Continuing Education, Minneapolis, Minnesota 55455, or by calling (612) 373-5454.

Laboratory Letter

Toxicology vs. the Laboratory

Laboratories are increasingly involved in a second aspect of toxicology. The tests for patient overdosage have a long history, and now we're increasingly involved in iatrogenic overdosage, either for the patients who are unusually sensitive to a drug or for the diseases which require a near toxic therapeutic drug level.

Salicylate levels are among the easiest to do—any lab with a colorimeter can do a quantitative test. Levels of less than 20 mg% are in the therapeutic range, and death may be expected at levels of over 50 mg%. A more accurate prognosis can be made with the aid of a nomogram that considers the time since ingestion.* Phenistix will often give a pink reaction when dipped in the urine of patients who have salicylate intoxication.

Quinidine levels are available but require laboratory instruments that are not available in every hospital.

Digoxin and digitoxin levels are now commonly available but only the fortunately situated patient and physician can get a result in one day. Digitalis toxicity is probably the most common adverse or toxic drug reaction in the hospital. Studies have shown that from 20 to 35% of digitalized hospital patients are toxic. According to the British Medical Journal, it has been in use for 200 years and we still don't know how to use it.

Digitalis levels approach toxic levels very easily: 30% of the lethal dose is a therapeutic level, and 60% of the lethal dose is a toxic level. If there are further complications, such as renal failure, (even mild reduction in the glomerular filtration rate), electrolyte imbalance, pulmonary disease, age, thyroid abnormality, variable absorption metabolism or drug potency, difficulty in achieving a therapeutic level is not surprising. Perhaps the

FDA would not approve it, if it was a new drug.

Usual serum levels are 1 to 2 ng/ml and over 3 ng/ml is almost invariably toxic. Values may vary according to laboratory methodology, so, as usual, it's best to check with your lab, and in addition, there may be significant differences in patient responsiveness. The physicians must have the serum drawn eight hours after the last digitalis dose, although drawing from six to 24 hours after the last dose may still provide useful, although less precise, information.

Classical toxicology, patient overdosage, remains a problem, as much a problem to the laboratory as to the clinician. Journal articles continue to be titled 'A Quick Method for Detection of Poisoning,' but the methods take a day or so to perform. Paper chromatography, as used to screen drug addicts, is neither fast enough nor quantitative. Certainly the quickest method for estimating the type and amount of ingested material is an investigation at the scene of the poisoning.

Alcohol is the most common patient overdosage and the toxic levels are well known. Its commonness leads to occasional overdiagnosis and most pathologists have received 'under the influence' patients who have actually died from another drug, perhaps in conjunction with alcoholic intake. Again, a careful history may provide the best immediate answer, although blood levels are available in many labs.

Barbiturate poisoning is still common. These drugs, in common with many others, are best identified by gas chromatography but this procedure will be reserved for a few laboratories that can afford the equipment and, more important, the specialized around-the-clock staffing. A serum level will usually take at least four hours and may take forty hours. Nevertheless, the following table may be of interest.[†]

*Minnesota Med April, 1965.

†Parker et al. Clin. Tox 3, Mar. 1970.

TABLE
Concentration of Barbiturate in the Blood vs. Degree
of CNS Depression

Barbiturate	Class Speed of onset Duration of action	Blood barbiturate level, ppm ($\mu\text{g/ml}$) Degree of depression ^a				
		1	2	3	4	5
Pentobarbital	Fast Short	2	0.5 → 3	10 → 15	12 → 25	15 → 40
Secobarbital	Fast Short	2	0.5 → 5	10 → 15	15 → 25	15 → 40
Amobarbital	Intermediate Intermediate	3	2 → 10	30 → 40	30 → 60	40 → 80
Butobarbital	Intermediate Intermediate	5	3 → 25	40 → 60	50 → 80	60 → 100
Phenobarbital	Slow Long	10	5 → 40	50 → 80	70 → 120	100 → 200

^aDegree of depression in nontolerant persons. 1—Under the influence and appreciably impaired for purposes of driving a motor vehicle or performing tasks requiring alertness and unimpaired judgment and reaction time. 2—Sedated, therapeutic range, calm, relaxed and easily aroused. 3—Comatose, difficulty aroused, significant depression of respiration. 4—Compatible with death in aged or ill persons or in presence of obstructed airway, other toxic agents, or exposure to cold. 5—Usual lethal level, the upper end of this range includes those who received some supportive treatment.

Phenothiazines can be semi-quantitatively evaluated in any lab with a simple ferric chloride urine test. This may be of value as an easy ruleout test.

Carbon monoxide poisoning accounts for about half of the fatal poisonings. In the hospital, or in chronic cases, diagnosis may be obscure. Pink skin will not be seen, although in severe cases the blood may be (slightly) brighter red. If no suggestive history is available, the symptoms of a feeling of fullness in the head, followed by headache, nausea and vomiting, and finally drowsiness and coma, may unfortunately be nonspecific. Mild, chronic cases may have palpitation, tachycardia, fatigue, nausea and headache. In acute cases, oxygen will relieve tachypnea and eliminate half of the carbon monoxide in thirty minutes or less, before the lab results are available. Levels of 7% or less may be found in smokers (even more in traffic policemen, who may be symptomatic), levels of over 10% may cause symptoms and death is common if the hemoglobin saturation is over 50%.

Acute or chronic lead poisoning is said to occur more frequently than appreciated. A simple, fluo-

rescent urine test can detect many cases when there is no time for the quantitative tests. Glutethimide poisoning is increasingly popular, and remains difficult for the laboratory to very quickly confirm.

Organic phosphorus insecticide poisoning will probably increase due to the banning of DDT, which is nearly non-toxic to humans. The substitutes, such as parathion, are highly toxic and absorbed by all routes, even through the skin. Fortunately, specific therapy is available. Screening tests for the affected cholinesterases are available; normal levels will vary according to the procedure that is used. A quantitative test is also available, and both procedures are the same as used to detect succinylcholine sensitivity.

When history is insufficient there remains what the FBI calls 'the general unknown.' Until recently this was a very difficult identification task. It is now possible to analyze these specimens with gas-liquid chromatography and paper chromatography, but for most acute poisoning cases, limited immediate availability subtracts from the usefulness of chromatography and we're back to relatively blind treatment of symptoms.

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St. Paul, Minnesota

*United Hospital—Miller, St. Paul, Minnesota

Community Abortion Services

The Role of Organized Medicine

JANE E. HODGSON, M.D.*

SINCE THE RECENT Minnesota Supreme Court statement regarding the unconstitutionality of the Minnesota abortion law, there is no longer any legal impediment to the delivery of this medical service. Yet hospitals are cautiously eyeing one another, newspapers are speculating as to the policy each hospital will assume—and women are still forced to leave the state to terminate unwanted pregnancies.

As of this writing, three weeks since the momentous overturn of our nation's restrictive abortion laws by the U. S. Supreme Court, there has been no official reaction by organized medicine except one statement, which, unfortunately, seemed inconsistent and lacking in breadth and objectivity.

Dr. Charles A. Hoffman,³ president of the American Medical Association, recently deplored the Supreme Court ruling, and predicted a surge in the number of abortions that would be performed. "I am not a prude, but I am saddened and concerned about the seemingly lackadaisical attitude toward the taking of human life." But, in another statement concerning the shortage of medical facilities and doctors he added, "Improved medical health care is not a need of the people of this nation . . . it is a demand." It is difficult for him, as well as the rest of the medical establishment, to concede that pregnancy termination is part of health care. In women's struggle to gain control of their reproductive lives, the medical profession has been a most reluctant ally.

Similarly in the battle to legalize contraception, it was Margaret Sanger, the ministry, the legal profession and social workers who were the leaders. It was the Clergy Counseling Service who defied the legal restrictions on abortion, and relieved the patient pressure on physicians by referring their patients with unwanted pregnancies to Japan and Mexico, and after 1970, to New York state and California. But the doctors were scarcely aware of the details of the methods used. When so-called "legal" abortions were performed in

American hospitals, the old conventional methods were used—namely, a D&C under general anesthesia, accompanied by the hazards of a general anesthetic, increased bleeding, 2-3 days hospitalization and several hundred dollars of expense. No advances in technique had occurred since the old abortion laws had been written over one hundred years ago.

Consequently when New York state repealed its century-old abortion law in 1970, very few American physicians were familiar with the newer, safer techniques being used in Eastern Europe and Japan where abortion had been legalized for 30 years.

The majority of U. S. physicians had never performed even a "therapeutic" abortion. Gynecological specialists were unprepared to cope with the large number of women asking for quick, painless and low-cost abortions. An influx of patients into the medical system, combined with a shortage of participating physicians resulted in excessive fees. Established gynecologists and academicians maintained an aloof attitude because of the "shadowy" nature of the services to be provided.

The challenge to the New York medical profession was almost overwhelming, but their response to this medical crisis was indeed remarkable. The time has now come for each state to care for its own. Let us hope that Minnesota will not be found wanting.

In the years from July 1970 to July 1972, the physicians of New York state performed 402,059 therapeutic abortions and provided sufficient statistics to document the safety of the procedure and advantages of certain techniques.

Gordon Chase,⁴ the Administrator of New York City Health Service Administration, released the following information in November 1972:

In 1970-71 there were three first-trimester abortion deaths for a rate of 2.1 deaths/100,000 abortions; and in the second year (1971-72) this decreased to 0.5/100,000 abortions, indicating an

*Medical Director, Preterm, Washington, D.C.

extremely small risk attached to first-trimester abortions. Complication rates for first-trimester abortions dropped from 4.6/1000 abortions during the first year to 3.0/1000 abortions in the second year.

Mr. Chase further pointed out the definite improvement in the maternal mortality rate due to the decline in criminal abortions. The over-all maternal death rate in New York for the two-year period under the new law was 37.7 deaths/100,000 live births, a decline of 28% from the preceding two-year period when it was 53.2 deaths/100,000 live births. Infant mortality dropped to an all-time low in 1971 and out-of-wedlock births declined for the first time since 1954—a drop of 11.8%.

Legalizing abortion reduces illegal abortions, illegitimacy and abortion-related fatalities. In addition, we may conclude that abortion is "safe" when performed by vacuum aspiration during the first trimester. Procedures performed in the second trimester entail a risk three to five times as great.

In a recent decision this past June, the Federal Court of Appeals declared unconstitutional Maryland's therapeutic abortion law requiring that abortions be performed only in licensed, accredited hospitals.² This was a first and very important step in legitimizing the role of free-standing clinics in community abortion services. Following the testimony of Dr. Irving Cushner, Dr. Allen Barnes, Dr. Christopher Tietze, and others, Justice Young found as a fact that the requirement that abortions be performed only in licensed, accredited hospitals places a burden on women's rights to such an abortion, which burden would be lightened by permitting abortions to be performed in other facilities. With appropriate regulations, facilities other than hospitals can and do protect the health of the woman seeking an abortion as adequately as hospitals do.

In 1968 at the time that Maryland's Therapeutic Abortion Act had been passed there was little knowledge of the demands on hospital facilities under a liberalized law. The feasibility of legalized abortion was not yet established, nor were the types and seriousness of complications determined; hence the mandatory law regarding hospitalization. The real focus of attention then, only four years ago, was on the *reasons* for abortion, rather than *where* they should be performed. Now we have

experience to draw upon, which is the basis for the recent Maryland decision against mandatory hospitalization.

During the hearing outstanding testimony was offered by Dr. Christopher Tietze² who referred to the oft-quoted Joint Program for the Study of Abortion Report (JPSA).⁶ Dr. Tietze pointed out that, according to JPSA the complication rate in abortions performed by vacuum aspiration in the first trimester of pregnancy was lower for the non-hospital clinics than for hospitals, and was also lower for hospital out-patient cases than for hospital in-patients. He further pointed out that the complication rate for early abortions by suction has been declining steadily, and declined approximately 50% from the third quarter of 1970 to the second quarter of 1971. This decline he felt was attributable in part to the increased skill of the physicians which comes from substantial experience in performing abortions.

Advantages of a Free-Standing Clinic

It has become apparent that it is not necessary to keep patients overnight, inasmuch as complications, if they do occur, usually begin three to five days later. Mandatory hospitalization places great strain on the availability of hospital beds, costs are increased, and scheduling delays result. At the present time it would seem impossible for hospitals to compete with the low fees offered at the free standing clinic.

Another advantage offered by the free-standing clinic is the greater ease with which problems concerning personal objections of physicians and paramedical personnel may be handled. Such problems are constantly arising in hospitals at the present time. Obviously it is not desirable to use physicians or paramedical personnel who view the procedure with disapproval. Sympathy with the women who have an unwanted pregnancy is required. Furthermore there is no place for restrictive hospital committees, except possibly to analyze statistics and evaluate techniques and complications.

Requirements of spousal and parental consent are rapidly being declared unconstitutional by the courts. As was so aptly stated by 100 professor of obstetrics in a recent statement on abortion "Any girl who is physically mature enough to conceive, should, *ipso facto*, be granted the freedom to determine the fate of her pregnancy."⁵

There are unique medical problems surround

ing the abortion patient. These women must be handled individually according to their special needs, and rigid hospital routines are not easily individualized. In contrast to hospital patients, these women are physically well and do not require the care and regimentation necessary for the truly sick.

They may use fictitious names and addresses. They may have no funds or insurance should complications arise which require hospitalization. Thankfully the pall cast over the procedure from illegality will soon be a thing of the past. Follow-up care and treatment of complications should improve greatly under the new legal status.

PRETERM Experience

PRETERM was conceived in March 1971 as a non-profit, tax-exempt, corporation, which is a total family planning agency located in the District of Columbia. The importance of integrating counseling, contraception, sterilization and abortion into one family planning clinic was emphasized. The value of personal counseling on a one-to-one basis was to be tested. Abortion, sterilization, contraceptive advice and sexual counseling were to be offered as necessary medical services, deliverable in a safe, humane, and inexpensive manner.

A high quality of service was maintained by the restricted use of board-qualified personnel (certified obstetricians and gynecologists). The importance of a healthy clinic-hospital relationship was emphasized.

Strict limitation of patients to those women whose length of gestation is ten weeks or less from conception date (12 week, LMP) has been a very important factor in maintaining a low complication rate. Medical and surgical complications are carefully screened and the higher-risk patients referred to a hospital setting.

High standards of care are also maintained by the integration of an active teaching program. There is an on-going training program for physicians, nurses, and paramedical personnel. High quality care is also maintained by careful record-keeping with analysis and publication of computerized data.

Community Role

Another important role of the free-standing clinic in community abortion service is participa-

tion in sexual and contraceptive education in the school system and adult organizations. A speaker's bureau is maintained to respond to calls from the community. Radio and television appearances are frequently made by the staff.

Another community service is the provision of free pelvic examinations, pregnancy tests, and gonorrheal cultures on a walk-in basis.

Treatment for gonorrhea and follow-up therapy is provided free of charge.

By applying principles of sound business organization and management, the cost of medical services can be decreased by several factors:

1. Utilization of paramedical personnel instead of physicians where possible.
2. Physicians are salaried instead of being paid on a fee-for-service basis.
3. High patient volume (60 abortion procedures/day).
4. Maximum utilization of physical plant (six days each week).

The \$125.00 fee paid by the patient includes: laboratory charges, abortion procedure, follow-up examination if desired, contraception, personal counseling and the administration of Rh_n (D) — immune globulin (human)* where indicated.

Seventy-two appointments are made by telephone each day. There are a few "no-shows" each day, as well as referrals of patients to other agencies. The result is an average schedule of 60 vacuum aspirations/day, six days a week.

Everyone is on a first name basis and anonymity is guaranteed. The personnel are not required to wear uniforms, and patients do not undress. There are no routine medications. If the patient is not a candidate for an abortion procedure, every attempt is made to refer her to the proper agency.

During 23 months of operation over 24,000 abortions have been performed, with no mortalities, low complication rates, and intensive counseling for each patient. Ninety-four percent of these patients accepted some method of contraception at the time of the procedure.

In 1973 the free-standing clinic serves as the main source of delivery of this highly specialized service. At the present time, the free-standing clinic can terminate first trimester pregnancies far more economically and expeditiously and with a better safety record than the usual hospital. Treatment can be individualized and humanized more readily in the free-standing clinic than in the impersonal and highly regimented hospital

*RhoGam.

with its actually sick patients. Clinic personnel can be more carefully screened and become more highly specialized. The clinic environment furthermore lends itself more readily to abortion counseling and contraceptive education than does the hospital.

In the 24,000 abortion procedures performed at PRETERM, no complications have occurred because of, or were affected by, our ten-minute separation from a hospital. Undoubtedly, some real emergencies can and will occur, such as perforations, hemorrhage, and novocaine reactions. Therefore, the typical physician's office is not

adequate in regard to personnel, equipment, counseling, or general organization. Pregnancy termination is a highly specialized service, one that is not easily forced into our costly and complicated hospital systems—at least until hospitals can accommodate their prices and routines to meet the existing demands.

Perhaps the time will come when the free-standing abortion clinics will be administered and absorbed by hospitals. But in the meantime, let us overcome our lagging leadership and get on with the work at hand. As Dr. Allen Barnes once said, "The time to start was yesterday."¹

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MONSIEUR FILERIN: Have you no shame, gentlemen, to show so little prudence for men of your age, and to quarrel like young fools? Don't you see how much harm such quarrels do us among the public? And isn't it enough that wise men see contrarieties and dissensions among our authorities and ancient masters, without also revealing to all people, by our arguments and quarrels, the quackery of our art? . . . These disputes do medicine no good. Since heaven has been gracious to us for so many centuries to make people infatuated with us, let's not disabuse them with our extravagant cabals; let's profit by their foolishness as charmingly as we can. We aren't the only ones, you know, who try to get an advantage through human weakness. That's what the greater part of the world studies . . . But the greatest weakness of men is their love of living; and we profit from it by our pompous nonsense, and we know how to get ahead through that veneration which the fear of dying makes them have for our profession.*

*Moliere, L'Amour Medecin, 1665.

Glossary

Drug Related Terms

DUNCAN JONES,* AND MICHAEL RALKE*

Acapulco Gold—*high grade of marijuana, [somewhat gold in color], supposedly grown in the area of Acapulco, Mexico.*

acid—*LSD-25.*

acidhead—*LSD user.*

amped—*high on stimulants, usually amphetamine.*

angel dust—*powered PCP, (phencyclidine or "Seryl" an animal tranquilizer), taken alone, or smoked with marijuana or some other leafy material.*

bag—*about an ounce of marijuana or other drugs, usually in a plastic bag, sandwich size or the size used in coin shops.*

bandits—*chemicals produced in a non-pharmaceutical setting.*

barb—*any CNS depressant that is not a tranquilizer, opiate or synthetic opiate.*

black beauty—*Biphetamine.*

blow the vein—*the use of too much pressure when injecting into a weak or sclerosed vein.*

blue devils—*Amytal sodium.*

bombed—*usually drunk, could mean high on any drug, more often referring to a depressant high.*

bread—*money.*

bummer—*any negative experience, or a "bum trip."*

bum trip—*negative experience under the influence of a drug, usually hallucinogenic.*

burn—*to swindle someone into buying a misrepresented chemical.*

burned out—*someone who has suffered damage from drug use over a long period of time, or a state of being more serious than spaced out from drug use over a short period of time.*

busted or cracked—*to be arrested.*

buzz—*a slight pleasurable sensation, usually noticed in the region of the head, from the entrance of a drug into the body area to be affected.*

cactus—*referring to mescaline or the peyote cactus.*

cap—*usually a gelatine capsule containing a mood-altering substance.*

cartwheels—*usually amphetamine sulfate, in tablet form, with a crisscross scoring on one side.*

chick—*chauvinist or street term for a female; cocaine.*

chillum—*funnel shaped pipe used to smoke marijuana, marijuana and hashish, or hashish and tobacco.*

chipping—*using a chemical on an infrequent basis, usually referring to the more psychically and physically addictive drugs.*

Christmas Tree—*Dexamyl.*

cibas—*Doriden.*

coke—*Cocaine.*

cold turkey—*to withdraw from a physically addictive chemical, without the aid and comfort of other medications.*

coming down—*a state of being following the peak effect of a drug.*

con—*to swindle or manipulate.*

connect—*to purchase an illicit drug.*

connection—*the person with whom one connects.*

contact high—*to experience vicariously the high of a drug without having taken it.*

cop—*to connect for a chemical.*

*Co-directors of "Pharm House I" located in the West Bank Area of Minneapolis.

GLOSSARY

- cop to**—to admit to, or 'fess up'.
- co-pilots**—amphetamines, usually Benzedrine.
- count**—the quality and/or quantity of an illicit drug purchase.
- crank**—amphetamines.
- crash**—to go to sleep.
- crash pad**—a place to crash.
- crystal**—Methamphetamine hydrochloride.
- cut**—to alter a drug by adding other substances, usually dilutants such as quinine or milk sugar.
- dealer**—illicit drug supplier.
- deck**—a small packet of a drug such as heroin.
- DET**—diethyltryptamine
- dexies**—Dexedrine, Dexamyl.
- dime**—ten dollars.
- dirty**—impure drugs, or an unsanitary needle.
- DMT**—dimethyltryptamine.
- dollies**—methadone.
- DOM**—dimethoxy-4-methylamphetamine.
- dope**—any psychoactive substance.
- dope fiend**—someone who uses dope (see above) in a fairly regular manner.
- do up**—usually referring to injecting a drug into the vein.
- downer**—any CNS depressant.
- drop**—to take a drug orally.
- dropper**—homemade syringe device employing an eyedropper.
- dust**—Cocaine.
- dynamite**—anything of excellent quality, (people, dope or music etc.)
- electric kool-ade**—beverage containing Emma or Miss Emma, referring to morphine.
- far-out**—see dynamite.
- fit**—usually referring to a hypodermic syringe, preferably glass on glass.
- fix**—an injection, usually intravenous.
- flashback**—a recurrence of a small or large portion of an hallucinogenic experience usually brought on by stress or stimuli strongly identifiable with the experience; seems to be a function of the memory and, more often than not, stems from a bad trip or a trip interrupted by other drugs (e.g. someone treated with large doses of thiorazine for a bad trip.)
- flash**—orgasmic euphoria induced by the intravenous injection of a chemical.
- football**—oval shaped amphetamine tablets.
- freak**—to become acutely fearful; one who adopts a counter culture life style.
- freakout**—an acute fear reaction usually due to hallucinogens.
- front**—to distribute drugs, usually in large quantities, on credit.
- get off**—when the drug is taking effect
- grass**—marijuana.
- hash**—strongest part of the marijuana plant, the resin of the flower tops.
- head**—a person who uses dope, usually acid or grass.
- head shop**—a store which sells miscellaneous items for dopers, (posters, incense, pipes, marijuana papers, etc.)
- hearts**—amphetamines.
- high**—under the influence of a chemical.
- hit**—a single dose of a drug.
- hit up**—to inject intravenously.
- hog**—Benactyzine or PCP.

DRUG RELATED TERMS

- hold**—*to have in possession an unprescribed or illegal drug.*
- horse**—*heroin.*
- jacking off**—*masturbate, or repeatedly pumping one's blood into and out of the syringe to get the fullest effect from "the hit."*
- J**—*a marijuana cigarette.*
- joint**—*same as J, also a prison or jail.*
- jones**—*a physical dependence, usually on heroin.*
- junk**—*heroin.*
- junkie**—*usually referring to a heroin addict, any chemically dependent person.*
- key**—*a kilo of marijuana or hashish.*
- kick**—*a good feeling, or, more often, to stop using a drug in which one has been dependent.*
- lid**—*about an ounce of marijuana.*
- LSD**—*Lysergic acid diethylamide.*
- magic mushroom**—*or mushroom, referring to the psilocybin mushroom.*
- mainline**—*intravenous injection.*
- MDA**—*methylenedioxyamphetamine.*
- mescaline**—*an hallucinogenic derivative from the peyote cactus.*
- meth**—*methamphetamine hydrochloride.*
- meth freak**—*one who uses meth.*
- mike**—*microgram.*
- miss**—*the unsuccessful attempt to inject a chemical into a vein.*
- muscle pop**—*injecting the chemical into a muscle.*
- narc**—*a Federal Narcotics Agent.*
- needle flash**—*the sensation of the needle prick before the drug is injected.*
- needle freak**—*one who is imbued with the needle flash.*
- nickle bag**—*a five dollar quantity of a drug.*
- nodding**—*the act of slowly dropping ones head, repeatedly, after injecting a drug.*
- OD**—*an overdose.*
- outfit**—*the paraphernalia involved in intravenous injection, an eyedropper or syringe, a disposable needle, a gasket to seal the unit, and a spoon and a book of matches to 'cook up' or make injectable the chemical to be used by combining it with water and heating the mixtures and cotton to strain.*
- overamped**—*to be under the influence of a very high dose of an amphetamine.*
- Panama Red**—*reddish looking marijuana from Panama.*
- PCP**—*Serynl, phencyclidine, an animal tranquilizer.*
- peyote**—*a cactus from which mescaline is derived.*
- pig**—*policeman, or an unattractive person.*
- pill freak**—*one whose main form of drug use is taking tablets and capsules.*
- plant**—*an ignorant policeman's method of placing drugs in someone's possession.*
- point**—*needle for injections.*
- pop sub**—*cutaneous injections.*
- pot**—*marijuana.*
- psychedelic**—*substances that alter one's consciousness.*
- queen**—*a male assuming a female role in a homosexual relationship, or a male dressing in female clothing, usually called a "drag queen."*
- rainbows**—*Tuinal.*
- rap**—*conversation, usually not banal.*
- reds**—*Seconal, also called red devils.*
- reefer**—*a marijuana cigarette.*
- rip off**—*to steal.*

GLOSSARY

- roach**—*the end of a marijuana cigarette.*
roach clip—*mechanical device for holding the roach.*
rush—*see flash.*
scag—*heroin.*
score—*see cop.*
scrip—*a prescription, obtained illegally or legally.*
shoot—*to inject intravenously.*
shooting gallery—*a popular place to go to shoot drugs.*
smack—*heroin.*
snapper—*amyl nitrate.*
snort—*to inhale a drug through the nose.*
snow—*cocaine.*
sopors—*quaalude, a non-barbiturate hypnotic, becoming extremely popular in conjunction with beer and cheap wine, thereby producing the all-American high, falling-down stinko drunk*
speed—*any amphetamine.*
speed ball—*an injection of a stimulant and a depressant.*
speed freak—*one whose primary drug usage concerns itself with stimulants.*
spike—*hypodermic needle.*
spoon—*about a tenth of an ounce of a powdered drug, also used for preparing an injectable drug.*
stash—*one's personal supply of dope.*
stoned—*under the influence of a drug.*
STP—*a 48 to 72 hour hallucinogen, reported to stand for Serenity, Tranquility, and Peace.*
strung out—*actively dependent upon a chemical.*
THC—*tetrahydrocannabinol.*
tie—*anything tightly wrapped around the arm to make the veins stand out.*
toke—*oral inhalation of marijuana smoke.*
track—*the mark resulting from an intravenous injection.*
trip—*the experience while under the influence of a drug.*
turned on—*under the influence of a drug, sexually aroused, or just feeling good.*
vibes—*non-verbal communication, gut feeling for another individual.*
weed—*marijuana.*
whites—*dexedrine or benzedrine.*
wired—*under the influence of a stimulant.*
works—*see outfit.*
yellow jackets—*Nembutal.*
zip—*any amphetamine.*

A Review of "Endymion" by John Keats

It is a better and a wiser thing to be a starved apothecary than a starved poet; so back to the shop Mr. John, back to "plasters, pills, and ointment boxes," etc. But, for Heaven's sake, young Sangrado,* be a little more sparing of extenuatives and soporifics in your practice than you have been in your poetry.†

*Doctor Sangrado: a character in Le Sage's novel *Gil Blas*.

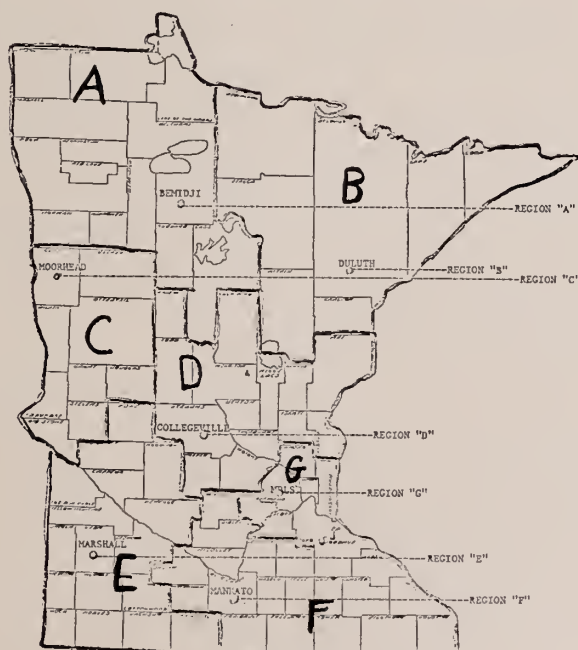
†John Gibson Lockhart or John Wilson, "Cockey School of Poetry No. IV," *Blackwood's Magazine*, August, 1818.

Regional Clearinghouses for Drug Abuse Information

With funds provided by a grant to the Minnesota State Planning Agency from the Governor's Commission on Crime Prevention and Control, and with matching funds from the Legislative Advisory Committee, the Drug Abuse Section of the State Planning Agency has set up a statewide network of Regional Clearinghouses for Drug Abuse Information. These Clearinghouses provide many services, and they are ideal as informative and referral centers for use by physicians throughout the State. Each Regional Director provides information about functioning organizations working with drug-related problems in his district. His office is a ready source of information and educational materials. In some regions, there are other services involved with drug crisis intervention that are open nights and weekends, when the Regional Clearinghouses are closed. The Drug Abuse Section of the State Planning Agency and the Minnesota Commission on Alcohol Problems have issued in 1972 a Directory of Alcohol and (other) Drug Programs in Minnesota, a copy of which will be sent to anyone requesting it. For a copy of that directory, write or telephone:

Bruce Bomier,
Coordinator of Drug Abuse Education
Drug Abuse Section, State Planning Agency
Suite 402, Metro Square Building
7th & Robert Streets
St. Paul, Minnesota 55101
(612) 296-3991

The Regional Clearinghouses for Drug Abuse Information serve areas shown in the Figure. They are:



Figure

REGIONAL CLEARING HOUSES

Region A

Region "A" Drug Awareness Clearinghouse,
107 Birch Hall,
Bemidji State College,
BEMIDJI, Mn 56601
(218) 755-2619

Region B

NORDIC (Northern Regional Drug Information Clearinghouse),
231 College Street,
DULUTH, Mn 55812
(218) 726-8495
UMD Center for Drug Information and Education,
University of Minnesota, Duluth,
DULUTH, Mn 55812
(218) 726-8510
Duluth Contact Center,
302 West Second Street,
DULUTH, Mn
(218) 722-4404
Hours: 8:30 p.m. to 6:30 a.m., seven days per week.

Region C

Region "C" Drug Information Center,
Box 185,
Moorhead State College,
MOORHEAD, Mn 56560
(218) 236-2773
Fargo-Moorhead Hotline, Inc.,
c/o Family Service,
34 Third Street North,
MOORHEAD, Mn 56560
(218) 235-7335
Hours: 7:00 p.m. to 1:00 a.m., every day (8:00 p.m. to 11:00 p.m. during the summer).

Region D

Region "D" Drug Awareness Clearinghouse,
Saint John's University,
COLLEGEVILLE, Mn 56321
(612) 363-7725

Region E

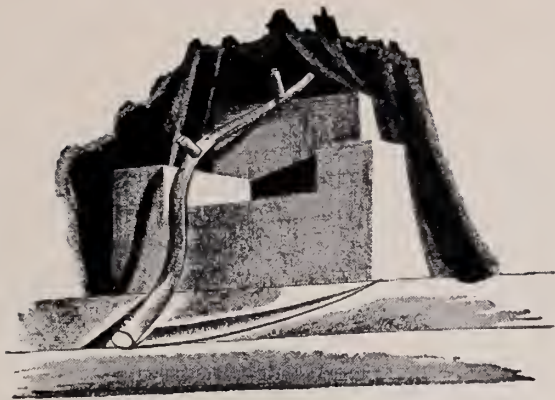
Region "E" Drug Information Clearinghouse,
Southwest Minnesota State College,
MARSHALL, Mn 56258
(507) 537-7352
Project H.E.L.P. (Emergency phone service; counseling and information)
MARSHALL, Mn 56258
(507) 532-9540
Hours: Friday, Saturday and Sunday, 9:00 p.m. to 1:00 a.m.; 24-hour message-recording service, every day.

Region F

Region "F" Drug Information Clearinghouse,
Box 007,
Mankato State College,
MANKATO, Mn 56001
(507) 389-6425

Region G

Metro Drug Awareness,
Room 510,
250 South Fourth Street,
MINNEAPOLIS, Mn 55401
(612) 348-8027
YES (Youth Emergency Service),
1423 Washington Avenue South,
MINNEAPOLIS, Mn 55404
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In Memoriam

*They are not gone who pass,
Beyond the clasp of hand,
Out from the strong embrace.
Hugh Robert Orr, They Softly Walk.*

JOHN N. FERGUSON, M.D.

Dr. John N. Ferguson, 41, St. Paul internist, died January 22. He was born in Keokuk, Iowa, and graduated from the Washington University School of Medicine in St. Louis, Missouri.

He was a member of the Ramsey County Medical Society, the American Medical Association and the Minnesota State Medical Association.

His wife, Catherine, two sons, Gregory and David, and one daughter, Ann, survive him.

LEONARD ANTHONY VERANTH, M.D.

Dr. Leonard A. Veranth, 60, St. Cloud physician, died December 22. He was born in Ely and graduated from Marquette University Medical School, Milwaukee, Wisconsin.

He was a member of the Board of Directors of Minnesota Hotel and Motel Association, Stearns-Benton County Medical Society, the American Medical Association and the Minnesota State Medical Association.

Dr. Veranth is survived by his wife, Bernelda, son, Joseph, and daughter, Amy.

GEORGE CLARK ROTH, M.D.

Dr. George Clark Roth, 59, St. Paul internist, died January 15. Born in Boonville, Indiana, Dr. Roth attended Northwestern University Medical School in Chicago.

He was a member of the Ramsey County Medical Society, the American Medical Association and the Minnesota State Medical Association.

Dr. Clark is survived by his wife, Eleanore, two daughters, Patricia and Diane, and one son, George C., Jr., a physician.

BENJAMIN ANTHONY WEIS, M.D.

Dr. Benjamin A. Weis, former chief of staff of Miller

Hospital and past president of the Ramsey County Medical Society, died January 15. He was 68.

Born in Primghar, Iowa, he graduated from the University of Minnesota Medical School. Dr. Weis was a member of the Minnesota State Medical Association, the American College of Physicians, the American Medical Association, the Ramsey County Medical Society, the Twin Cities Diabetes Association and the St. Paul Chamber of Commerce.

Dr. Weis is survived by his wife, Lois, and three daughters, Mrs. John Rogers, Mrs. Thomas Skinner and Mrs. David Culligan.

WILLIAM H. THOMAS, M.D.

Dr. William H. Thomas, 51, Wayzata, physician, died January 9. He was born in Minneapolis and obtained his medical degree at the University of St. Louis. After practicing at Howard Lake for eight years, he joined a medical clinic in Lindstrom and was there for two years. In 1961 he started practicing in Wayzata.

Dr. Thomas is a member of the Hennepin County Medical Society, the Minnesota State Medical Association and the American Medical Association.

His wife, Judy and son, Ira, survive him.

OLAF A. OLSON, M.D.

Dr. Olaf A. Olson, 95, physician, died January 3. He practiced medicine in Minneapolis until he was 90. Born in Sweden, he came to this country with his family when he was just a small child. His medical education was obtained at the University of Minnesota.

He was a member of the Hennepin County Medical Society and the American Medical Association and a 50 Club and Life Member of the Minnesota State Medical Association.

Nieces and nephews survive him.



**She came from a nice quiet town
to find something stronger than marijuana.**

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don't have any drug problem.
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move away. And die someplace
else.

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people, disturbed people are
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Book Reviews

MODERN MANAGEMENT OF MENINGOMYELOCELE: Wilton H. Bunch, M.D., Ph.D.; Alexander S. Cass, M.D., B.S., F.R.C.S.; Alexander S. Bensman, M.D.; and Donlin M. Long, M.D., Ph.D., Warren H. Green, Inc., 320 pages, \$15.00.

Modern Management of Meningomyelocele stresses the interdisciplinary approach to management of the meningomyelocele child and anybody interested in habilitation of the handicapped child will find the book interesting and informative reading. The text has socioeconomic as well as medical significance since habilitation of most meningomyelocele children requires long periods of hospitalization and multiple surgical procedures. The authors believe, as does Durham Smith and others who have worked with these children, that it is less expensive to habilitate the handicapped child and allow him to become a functional member of society than it is to institutionalize him indefinitely. The merit or demerit of this approach is impossible to assess at present since, as the authors point out, none of the habilitated children have reached adulthood. Results to date, however, are encouraging and indicate, for example, that 60 percent of these children will be able to attend regular schools. In the past untreated meningomyelocele children who did not die in the first few months of life from meningitis (15 to 20 percent of these born with the defect) often lived for many years as hopeless cripples. The authors demonstrate convincingly that the goal of treatment is prevention of complications rather than correction of such defects once they have occurred; little can be done for the five-year old who presents with severe hydrocephalus, scoliosis, contractures, and uremia from urinary tract infection and vesicoureteral reflux.

While making a convincing case for habilitation of the meningomyelocele child from the child's and society's standpoint, the authors have not considered the effect of such a handicapped child on the family unit. Certainly, the lifestyle of a family who elects to raise their meningomyelocele child at home rather than to institutionalize him is changed considerably. It is particularly disheartening to see normal siblings neglected because the parent's time and resources are channeled, at times almost exclusively, toward the handicapped child.

The urological experience of Dr. Cass at the Gillette Hospital is of particular interest since he has had the opportunity to compare the results of conservative care (crede' voiding, catheter drainage, suprapubic tube, and vesicostomy) with a variety of different types of conduit drainage using large and small intestine. This study shows that early supravescical diversion can preserve renal function in patients who have normal urinary tracts and that renal function can be improved in some patients who have upper tract dilatation prior to surgery. The chapter on Orthopedics by Dr. Bunch, Neurosurgery by Dr. Long, and Habilitation by Dr. Bensman are equally informa-

tive and in comprehensive fashion cover the care of these children from birth to adolescence. This text should be required reading for anyone concerned with the care of the meningomyelocele child.

Daniel C. Merrill, M.D.
Minneapolis, Minnesota

SYNOPSIS OF GYNECOLOGY by Beacham and Beacham, 8th Edition; C. V. Mosby Co. \$10.90.

H. S. Crossen, in his preface to the first edition of this book (1932), pointed out that its primary value would be for medical students preparing for careers in unrelated specialties. The book has undergone numerous revisions and changes in authorship over the years, with the current edition being the first since 1967. The intended readership remains the same, however. Much attention, therefore, is concentrated on techniques of gynecologic examination and diagnosis.

There are some organizational difficulties in the chapter and subchapter arrangement, but the text itself is concise and highly readable. The illustrations are complementary and generally well done. The bibliographies, while not extensive, are pertinent.

Emphasis on such contemporary problems as contraception, and the inclusion of an interesting section on medicolegal aspects of gynecology, help make this a worthwhile and up-to-date mini-text.

Arthur H. Bearon, M.D.
Minneapolis, Minnesota

DIAGNOSIS AND TREATMENT OF HEMOPHILIA: A PRACTICAL GUIDE by Herbert S. Strauss, M.D. Albany Medical College, 86 pages, 3rd edition, \$3.50.

This short book reviews the entire field of coagulation. It offers much to the busy practitioner, the physician in training and to the interested nurse. The genetic basis, the carrier state, and newly described immunologic problems are well discussed. With only 11 of 85 references older than 1966 and many in the bibliography from 1972, the information is totally up-to-date. Further investigation by the reader is easily followed up by use of the excellent bibliography. Two points of controversy are found: factor VIII content in average pack of cryoprecipitate is fairly well accepted as being about 80-90 units rather than 110 units and normalization of the PTT after factor VIII replacement is not always true (and may in fact be misleading if unrecognized). The book can be read in 60-90 minutes and imparts much easily understood information. It belongs in hospital libraries and should be read by the doctor involved in either bleeding management problems or in diagnosis of such. No other publication covers so much in such a short space.

Lawrence J. Singher, M.D.
Minneapolis, Minnesota

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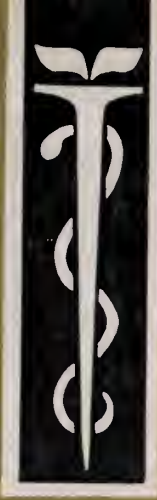
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Contraindicated: Known hypersensitivity to the drug. Children under 6 months of age. Acute narrow angle glaucoma; may be used in patients with open angle glaucoma who are receiving appropriate therapy.

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Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

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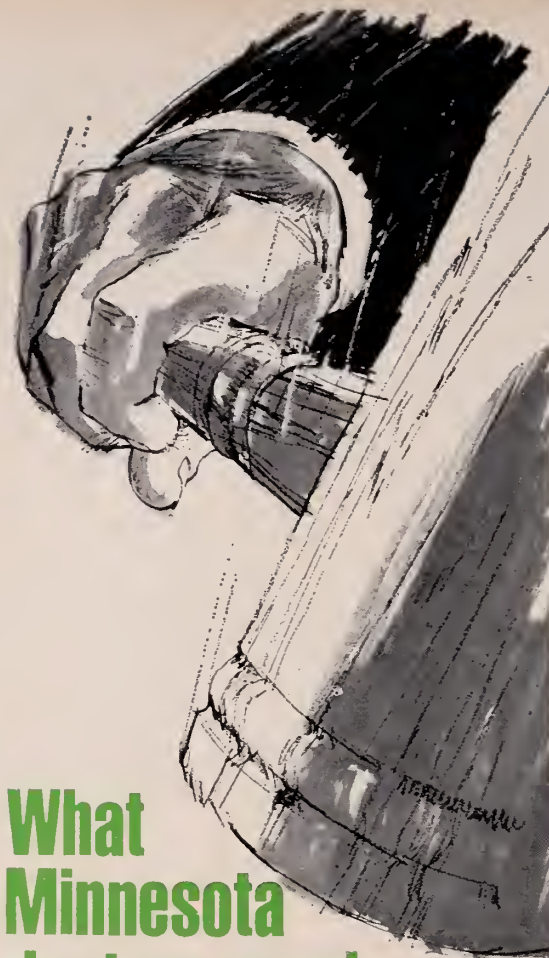
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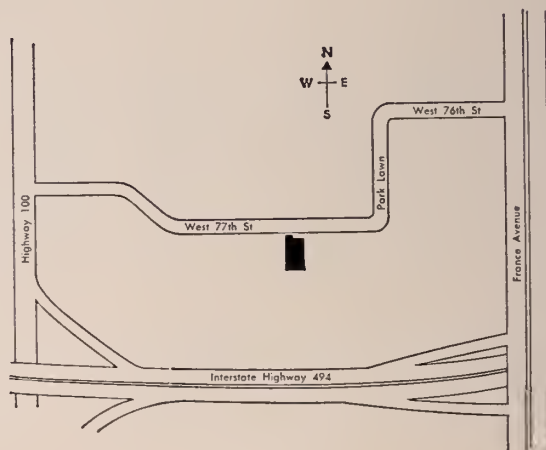
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MINNESOTA MEDICINE REPRESENTS

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tential risk of severe, even fatal, reactions. The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias, including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonylurea, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug. **Precautions:** The following should be accomplished at regular intervals: Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activity requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

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gastritis, epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, aplastic anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fatal and nonfatal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angiitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomata, aggravation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with overdosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement. (B)98-146-800-F (10/71)

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of age. Though physical and psychological dependence have not been reported, recommended doses, use caution in ministering to addiction-prone individuals or those who might increase dosage.

Precautions: In elderly and debilitated patients, initial dosage should be limited to 15 mg to preclude oversedation, dizziness or ataxia. If combined with other drugs having hypnotic or CNS-depressant effects, consider potential additive effects. Employ usual precautions in patients who are severely depressed, or with



depression or suicidal tendencies. Blood counts and liver and kidney tests are advised during therapy. Observe usual precautions of impaired renal or liver function.

Reactions: Dizziness, drowsiness, lightheadedness, staggering, ataxia have occurred, particularly in elderly or debilitated patients. Severe lethargy, disorientation and possibly indicative of drug intolerance, have been reported.

Also reported were headache, heartburn, upset stomach, nausea, vomiting, diarrhea, constipation, GI pain, nervousness, talkativeness, apprehension, irritability, weakness, palpitations, chest pains, body and joint pains and GU complaints. There have also been rare occurrences of sweating, flushes, difficulty in focusing, blurred vision, burning eyes, faintness, hypotension, shortness of breath, pruritus, skin rash, dry mouth, bitter taste, excessive salivation, anorexia, euphoria, depression, slurred speech,

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President's Letter



Options for the Future

THIS MONTH MINNESOTA MEDICINE previews the 120th annual meeting at the Radisson South in Minneapolis May 24-25, 1973. The scientific program is completed and several specialty societies are meeting in conjunction with the state meeting. The reports of last year's activities are being compiled, resolutions from the delegates, county and specialty societies and committees of the Association are being submitted.

In previous years, approximately a thousand physicians have registered and participated in the annual meeting activities. I hope that number will be significantly increased this year. At no time in the past have as many issues been before us; has medicine been criticized as severely; have there been as many governmental, consumer, media, hospital or insurance groups as outspoken about what they feel are our shortcomings.

The time is now at hand for medicine to take a decisive stand for what is best for medical and health care. What are your views on unionization, strengthening our own society, splintering into specialty groups or special interest groups, national health insurance, Ameriplan, Medi-Credit, the Kennedy Bill, PSRO's, peer review, quality assurance, continuing education? Will we sit back and complain about "organized medicine," the Minnesota State Medical Association or the AMA, or will we strive to weld a common front of excellent physicians improving our individual and collective capabilities for delivering the best medical care?

Do you wish to take part in these decisions? Get your facts and make your voice heard in person or through your delegate to the Minnesota State Medical Association House of Delegates. It's your option. Will you exercise it or are you going to be too busy to take part in shaping your future?

George B. Martin

President
Minnesota State Medical Association

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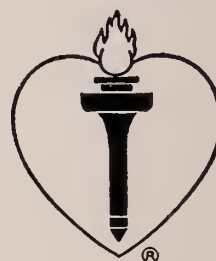
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—Y'all Come—

to the Radisson South for the 1973 Annual Meeting

ALL ROADS LEAD to the Radisson South, Bloomington for the annual meeting of the Minnesota State Medical Association. It's the year of enrichment, and on May 24 and 25 the medical doctors of the state will come together to take part in their profession's scientific assembly.

This year, more than ever before, the aim of the program is to aid the physician in his constant effort to update and increase his knowledge of what's new and improved in the world of medicine—and to help him incorporate what he sees, hears, and learns into his daily practice.

On May 24 the scientific sessions evolve from the theme, "Physiology in Daily Practice" and cover the spectrum of life-supporting organs of man.

Getting right to the heart of the matter at 9:00 a.m. on the 24th, doctors will have the opportunity to hear about and discuss the physiology of the heart and developments in the field of cardiac care.

From there, the sessions go on to "The Kidney and Blood Pressure"; "Psychopharmacology and Brain Function" and "Immunology and Infections."

Because the delivery of medical care is the foremost concern of every physician, the program on Friday, May 25, will relate directly to the patient, moving from the 9 a.m. session on "Patient Education; The Basis of Quality Practice" to include, throughout the day, "Children in Trouble"; "Problems of Aging"; "The Personal Life of the Physician"; "Medical, Psychological and Social Hazards of the Abortion;" "Preabortion and Post-abortion Counseling;" and "The Abortion Procedure."

Each session will have a leader experienced and knowledgeable on his subject. As 1973 is the year of the history-making abortion ruling, the last two sessions on Friday, May 25, will be of special interest. Dr. Janc E. Hodgson of St. Paul will speak on the abortion procedure in the first trimester at the final session on Friday, May 25, followed by Robert Goodlin, M.D., Associate Professor of Obstetrics and Gynecology at Stanford University School of Medicine, who will give a presentation on abortion in the second trimester.

There'll Be Business—As Usual

The wheels have been turning to make this, the 120th annual meeting, 120 times more interesting and productive than any other. Committee chairmen have been busy arranging time and place for their meetings. The Physiatriic Society will meet in conjunction with this event on May 26—all day.

Councilors' activities begin at 5:30 p.m. on Tuesday, May 22 and continue on through Friday, May 25, ending in a dinner meeting at 6:30 p.m. The State office will inform councilors of all definite plans and schedules as they develop.

The House of Delegates will hold its first meeting at 1:00 p.m. on Wednesday, May 23. That evening the delegates will join the councilors to call it a day over a dinner buffet. The second session of the House will convene at 1:40 p.m. on Friday, May 25.

There'll Be Exhibits—Better Than Usual

Programs and breaks are planned to give everyone an opportunity to visit the exhibits in the Great Hall East. They'll be open Thursday and Friday, May 24-25 from 8:30 a.m. to 5:00 p.m. See them, too, in the Great Hall Center and the Great Hall Foyer.

There'll Be Breaks In The Motion

Beautiful surroundings and good food will provide pleasant breaks in the days' occupations. Luncheons in the celebrated Tiffany Room on Thursday and Friday; The President's Reception on Thursday in the lovely Garden Court are events to anticipate. And, in a grand climax, the annual banquet will bring together all attending physicians and guests. Among the honored guests of the evening are the physicians who are marking their 50th anniversaries as licensed doctors of medicine. Dinner and dancing, with an air of gracious sociality, will close two days of rewarding and professionally enriching experiences.

There'll Be Auxiliary Meetings

The Woman's Auxiliary will register its members from 5:00 p.m. to 9 p.m. on Wednesday,

May 23, on Thursday, May 24 from 8:30 a.m. to 2:00 p.m., and on Friday, May 25, in the morning, from 8:30 to 11:30.

The Auxiliary's Board of Directors will meet at 9:00 a.m. on Thursday, and they plan their annual meeting for 9:00 a.m. on Friday.

Pleasant breaks for the ladies will include a Sherry Hour and luncheon for board members on Thursday, followed by a tea for all auxiliary members, and their guests, at The Woman's Club of

Minneapolis.

The Camelot will provide the setting for the big annual luncheon from noon to 3:00 on Friday, May 25. Buses will be on hand for transportation. It promises to be the best yet for the Auxiliary in planning, programming, and attendance. No member will want to miss the 120th—The Radisson South in Bloomington, May 24 and 25, 1973.

Harley J. Racer, M.D.
W. Albert Sullivan, Jr., M.D.
Co-Chairmen

Preliminary Scientific Program Synopsis
May 24 and 25
Radisson South-Minneapolis
May 24: Physiology in Daily Practice

Basic scientists will join with clinical practitioners throughout the day to correlate cellular, organ, and system physiology with the problems met by the doctor in daily practice.

9:00-10:30 *Session I: The Big Heart*

a.m. Session Leader: Carlos E. Harrison, Jr., M.D., Division of Cardiovascular Diseases and Internal Medicine, Mayo Clinic, Rochester

- Normal muscle cell physiology and its alterations in common heart diseases.
- The relationship of cardiac work, ion exchange, myocardial oxygen consumption, and their linkage to cardiac contraction, conduction, and the use of energy
- Congestive failure, valvular disease, septal defect, potassium depletion
- Relationship of cardiac drugs to basic physiology

11:00-12:20 *Session II: Kidney and Blood Pressure*

a.m.-p.m. Session Leader: Cameron G. Strong, M.D., Division of Nephrology and Internal Medicine, Mayo Clinic, Rochester

- The handling of sodium and potassium by the kidney in health and in disease conditions and the relationship of this kidney work to renin and angiotensin production as factors in hypertension
- The handling of sodium in renal insufficiency
- Clinical treatment of hypertension based on physiologic concepts

1.40- 3:00 *Session III: Psychopharmacology and Brain Function*

p.m. Session Leader: Faruk S. Abuzzahab, M.D., Clinical Assistant Professor of Psychiatry, University of Minnesota, Minneapolis

- Advances in chemical, electrical, and circulatory physiology of the central nervous system in normal health and in diseased states: depression, schizophrenia, parkinsonism, and other common diseases
- Choice of drug treatment or other modalities related to physiologic concepts

3.30- 5:00 *Session IV: Immunology and Infections*

p.m. Session Leaders: Charles F. McKhann, M.D., Professor of Surgery, University of Minnesota, Minneapolis and Richard L. Simmons, M.D., Associate Professor of Surgery, University of Minnesota, Minneapolis

- Current concepts of immunology in the understanding and management of stress syndromes, infectious diseases, and some malignant diseases
- Clinical management related to basic physiologic concepts

(Continued on page 333)

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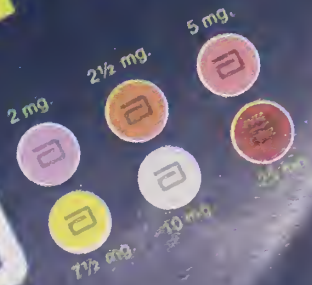
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Infectious Complications

Following Legal Abortion

EMANUEL GAZIANO, M.D.* AND EDWARD L. KAPLAN, M.D.*

RECENT ANALYSES indicate that the rate of early medical complications following legal abortion in the U.S.A. varies from two to almost ten percent depending upon the patient population, the duration of gestation, and the method of termination of pregnancy.^{1,2} Major complications such as uterine perforation, excessive blood loss, and serious pelvic infection have been reported to occur in only 1% or less of legal abortions.² One of the most common complications of legal abortion is the infection-hemorrhage syndrome which is associated with retained infected tissue or endometritis.¹

Minnesota had a restrictive abortion law in that abortions were allowed only when necessary to preserve the life of the pregnant woman.³ It is estimated that each year approximately fifteen hundred to two thousand Minnesota residents sought legal abortions elsewhere prior to the United States Supreme Court decision of 1973.[†] Residents of states with restrictive abortion laws seeking to terminate a pregnancy often had to travel long distances for the procedure. After these procedures are completed the patients are usually observed for a period of hours and then return home. Because of the distances involved and the psychological aspects which often accompany abortion, medical follow-up may not be optimal since the patients could be thousands of miles away from the hospital or clinic where the procedures were performed and may not seek care in their own community following their return. During a four month period (July 13, 1971 through November 11, 1971), 10 patients with

the infection-hemorrhage syndrome following legal abortion performed out of the state of Minnesota were admitted to the Hennepin County General Hospital in Minneapolis. The purpose of this paper is to call attention to the frequency of occurrence of this problem in one general hospital and to present the clinical features, bacteriological data, and management of these patients.

Patient Data

The clinical and bacteriological features of these 10 patients are listed in Table 1.[‡] The patients ranged in age from 15 to 40 years. Eight of the abortions were performed in New York City, one was performed in Canada and the other in Wisconsin. Seven of the patients were primigravid, while one to four pregnancies preceded the abortion in the remaining three.

The length of gestation at the time of abortion varied from seven to 20 weeks (mean = 10.6 weeks). Vacuum aspiration was performed on an ambulatory basis in eight patients: one dilatation and curettage was also performed on an outpatient basis. One pregnancy was terminated with intra-amniotic saline infusion during hospitalization.

Lower abdominal cramping pain, fever, chills and vaginal bleeding were present in all ten patients and usually occurred from two to five days following the procedure. The onset of symptoms occurred 12 hours after abortion in the patient whose pregnancy was terminated with intra-amniotic saline infusion. Vaginal bleeding following the procedure was not excessive in any of the patients, but increasing vaginal flow was often coincident with the development of pelvic pain and fever.

Recorded maximum temperature elevations ranged from 99.6°F. to 103.2°F. As can be seen from Table 1, there was a poor correlation between the highest recorded fever and signs of pelvic tenderness.

All patients exhibited marked pelvic tenderness to palpation while pelvic peritonitis, as manifest

*From the Department of Obstetrics and Gynecology and the Department of Pediatrics, Hennepin County General Hospital and the University of Minnesota School of Medicine. Supported in part by the Dwan Family Fund.

Presented in part to the Minnesota Obstetrical and Gynecological Society, Minneapolis, Minnesota, December, 1972.

Reprint Requests: Edward L. Kaplan, M.D., Department of Pediatrics, University of Minnesota, Minneapolis, Minnesota 55455.

†Based on an estimate by the National Center for Disease Control of 30 abortions per 1000 live births.³ (There were 62,557 live births in Minnesota during 1971 reported by the Department of Vital Statistics of the Minnesota State Health Department).

‡See page 271.

by abdominal rebound, was present in seven. Retained infected tissue was present within the uterus in four patients necessitating uterine reevacuation.

Cultures, using sterile cotton swabs, were obtained directly from the endometrial surface of the uterus in all ten patients. Blood cultures were obtained from eight of the ten patients on admission to the hospital. Cultures were incubated aerobically and anaerobically using blood agar, eosin-methylene blue and sodium azide plates, and both trypticase soy broth and thioglycolate broth.

Beta hemolytic streptococci were recovered from the endometrial cultures from three patients (Table 1.) In all three patients, these were reported as pure cultures. These three streptococci were characterized by the bacitracin disc technic as not being Group A, but the strains were unfortunately discarded before serological grouping could be performed. Gram negative bacteria were cultured from the endometrial surface from four patients, but no gram negative organism was isolated in pure culture. *E. Coli* was isolated from four patients, and *Klebsiella-enterobacter* from one patient. An anaerobic streptococcus (not further characterized) was isolated from the endometrial surface of three patients. *Staphylococcus epidermidis* was isolated from the endometrial cultures of six patients. Aerobic gram positive rods (not further characterized) and diphtheroids were each isolated once.

Of the eight patients from whom single blood cultures were drawn, the blood cultures were positive in three (37.5%): non-Group A beta hemolytic streptococcus,* *E. Coli*, and *Staphylococcus epidermidis*. In each patient, the same organism was also recovered from direct cultures from the endometrial surface. Two of the three patients with positive blood cultures had retained tissue in the uterus.

Five of the ten patients received antibiotic prophylaxis at the time of abortion. Three patients were given ampicillin; one received tetracycline, and the fifth, an unknown antibiotic. The specific dosages and duration of administration are unknown, but all were allegedly given orally. Two of the three patients with positive blood cultures had received no prophylaxis. The third patient received oral tetracycline as prophylaxis, yet *Staphylococcus epidermidis* was cultured from both blood and endometrial surface.

*Characterized by the bacitracin disc technic.

All patients were treated with bedrest and parenteral antibiotics, usually either penicillin or one of the cephalosporin group of antibiotics in combination with kanamycin. Antibiotic therapy was altered in some cases on the basis of the clinical response and results of the culture and antibiotic sensitivities. Parenteral antibiotics were then continued until the patient was afebrile at least 48 hours and pelvic tenderness was absent. Seven of the ten patients showed improvement within the first two to three days following therapy. In three patients, either fever or marked tenderness persisted for five to six days. Hospital stay ranged from three to eight days (average = 5.1 days).

Discussion

Nathanson reported an infection rate of fifteen per thousand first trimester ambulatory abortions by the vacuum aspiration method of terminating pregnancy.¹ Tietze reported an incidence of isolated pelvic infection following suction curettage as high as twelve per thousand, an incidence of two per thousand for hemorrhage and infection, and a rate of six per thousand for fever only.² These figures must be considered minimal since follow-up evaluations in both these series were incomplete. This is further suggested by a series from England reporting significant elevation of temperature from almost 30% of women following legal abortion.⁴ Stewart and Goldstein have recently reported a readmission rate of 1.6% following early uterine evacuation.⁵ These authors further suggested that while significant infection (endoparametritis and endometritis) was responsible for almost one-third of these readmissions, additional morbidity may result from post inflammatory tubular obstructions leading to sterility.

The bacteria recovered from these patients are not unexpected ones. Although the beta hemolytic streptococci recovered from the endometrial surfaces of three patients and from the blood of one patient were unfortunately discarded before they could be serologically grouped, these may well have been Group B streptococci since this group of beta hemolytic streptococci is commonly found in the vagina of pregnant women and not infrequently cause serious problems in the neonatal period.^{6,7} However, other serological groups of *Streptococcus pyogenes* (D, F, & G) as well as other streptococci, staphylococci, and coliform and diphtheroid bacilli are considered normal vaginal flora.⁸ Although not specifically studied at the time of abortion, the resemblance of the vaginal

flora to that of the vulva has been noted during the first few days following delivery.⁸ Thus, it is also possible that some of the gram negative organisms recovered from these patients may also have originated from the perineum. The coagulase negative staphylococci frequently recovered from women described in this study might be considered to represent contamination, yet the pres-

ence of the organism in both the blood and endometrial cultures in one patient suggests its pathogenic capacity.

While it is impossible to arrive at an accurate denominator to determine a complication rate, these very serious and potentially fatal complications of legal abortion must also occur with some

TABLE 1
Clinical and Bacteriological Features in Patients with Infection Following Legal Abortion

Patient	Age (Years)	Parity	Length of Gestation (weeks)	Method of Termination	Onset of Symptoms Following Procedure	Highest Recorded Temp. Elev. During Hospitalization (Degrees F.)
1	40	4	8	vacuum aspiration	5 days	101
2	17	0	12	"	3 days	99.6
3	20	0	8	"	3 days	103.2
4	20	1	11	"	3 days	101.6
5	23	0	9	"	2 days	100.8
6	17	0	7	"	2 days	101
7	20	2	9	"	5 days	100
8	22	0	11	"	3 days	100.2
9	15	0	11	D&C§	3 days	102
10	18	0	20	Intra amniotic Saline	12 hours#	99.6

Patient	Abdominal Rebound and Tenderness	Retained Tissue Present	Endometrial Culture	Blood Culture	Antibiotic Prophylaxis Prior to Abortion*
1	yes	no	Klebsiella-enterobacter E. Coli	Negative	Ampicillin
2	yes	no	Beta Hemolytic Streptococci (Non Group A)‡	Not Done	None
3	yes	no	Anaerobic Streptococci† Staphylococcus epidermidis	Negative	Ampicillin
4	no	yes	E. Coli Anaerobic Streptococci† Staphylococcus epidermidis	E. Coli	None
5	yes	no	Staphylococcus epidermidis Aerobic Gram Positive Rods†	Staphylococcus epidermidis	Tetracycline
6	no	no	E. Coli Staphylococcus epidermidis	Not Done	None
7	no	yes	Anaerobic Streptococci† Staphylococcus epidermidis Diphtheroids	Negative	Ampicillin
8	yes	yes	Beta Hemolytic Streptococci (Non Group A)‡	Beta Hemolytic Streptococci (Non Group A)‡	None
9	yes	no	E. Coli Anaerobic Streptococci† Staphylococcus epidermidis	Negative	None
10	yes	yes	Beta Hemolytic Streptococci (Non Group A)‡	Negative	Yes, Type Unknown

*All prophylactic antibiotic given orally—dosage not known.

†Not further identified.

§Dilatation and curettage.

‡Bacitracin resistant, not further characterized.

#Onset of symptoms occurred 12 hours after abortion not 12 hours after infusion of Saline.

frequency in hospitals in other communities throughout this country. While the number of women traveling long distances to other states for legal abortions will be reduced following the recent United States Supreme Court decision, it is likely that travel between rural areas and urban centers for this procedure may not be reduced. Physicians and those persons involved with abortion referral services should be aware of this prob-

lem so that careful medical attention can be given these women after their return to their home community. Hospitals and clinics performing legal abortion must evaluate carefully not only the risks involved in these procedures, such as endometritis and bacteremia, but also the potential latent effects on subsequent pregnancies. Finally, the role of antibiotic prophylaxis in legal abortion should be carefully studied.

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Many of our best friends have perished: among these—I grieve for the grief it will give you—Andrew Ammonio, in whom good letters and all good men have suffered a great loss. He thought himself protected against contagion by his temperance in food. It was due to this, he thought, that his whole household escaped, while almost everybody he met had their whole families laid up. He boasted to me and to many others of this, a few hours before he died. For in this Sweating Sickness death always comes, if it does come, on the first day. I, with my wife and children, am as yet untouched: the rest of my household has recovered. I tell you, there is less danger on a battle front than in London. And now, I hear, it is beginning to rage at Calais just as we are being driven there on diplomatic business—as if it were not enough to have lived among infection, but one must follow it when it goes.*

*Thomas More to Erasmus, August 19, 1517.

Veterans Administration

Three young men have completed their training as urological assistants and received certificates from the Minneapolis Veterans Administration Hospital: John Busch, a former Navy medical corpsman, who has started work with a private group of urologists in Mason City, Iowa; Silas Foiles, a former U.S. Army medical corpsman, from LaCrosse, Wis., who will be employed there by a private clinic; and Roger Ordal, Richfield, from the Navy medical corps, who has joined the Trover Clinic in Madisonville, Ky.

The program is the only one of its kind in the state designed to train assistants to the urological physician.

Renal Hamartoma

JOHN A. SOUCHERAY, M.D., HAROLD A. REIF, M.D., AND
CLYDE E. BLACKARD, M.D.

WITH AVAILABLE RADIOGRAPHIC techniques, the diagnosis of renal cell carcinoma is usually not difficult, however, as illustrated by the following case, a benign renal hamartoma can mimic a hypernephroma.

Case Report

A 68-year-old white female was admitted to the University of Minnesota Hospital for evaluation of a pneumonia. Her past history revealed several episodes of cystitis, but on admission, she had no lower urinary tract symptoms. Urinalysis revealed trace albumin and 10 to 15 white blood cells per high power field. The only other abnormal laboratory test was an erythrocyte sedimentation rate of 71. The clinical triad of convulsions, mental deficiency and adenoma sebaceum which characterize tuberous sclerosis was absent.

From the Division of Urology, Department of Surgery, University of Minnesota, Health Sciences Center, Minneapolis, Minnesota.

An intravenous urogram revealed a mass in the upper pole of the left kidney (Figure 1). An aortogram and left selective renal arteriogram demonstrated a mass that consisted of an abnormal vascular pattern with numerous "basketweave" type vessels, puddling of dye and a rapid appearance of the venous phase suggestive of shunting (Figure 2). The radiologic diagnosis was hypernephroma. Studies for metastasis were negative and subsequently a left nephrectomy with en bloc removal of the surrounding fat, including all of Gerota's fascia, and the left adrenal gland was performed. Her recovery was prolonged by severe post-operative tracheal edema which necessitated a temporary tracheostomy. In three and a half weeks she was discharged.

The gross tumor specimen consisted of a 10 centimeter lobulated partly hemorrhagic mass being moderately firm, greasy and yellow in color (Figure 3). It displaced



Figure 1

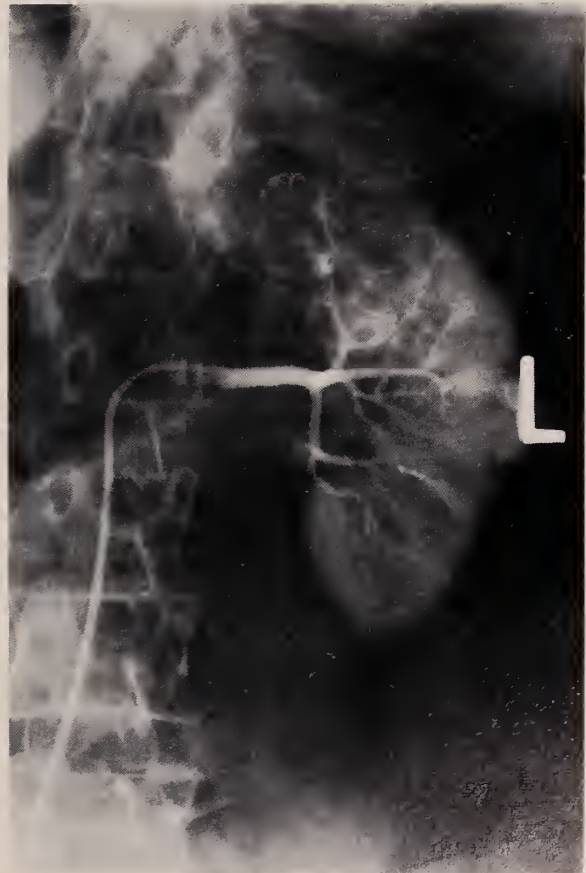


Figure 2

the pelvis and ureter downward without invasion and compressed surrounding renal substances. In most places it shelled out easily.

Microscopically it consisted mostly of mature fat with angiomatous and leiomyomatous elements (Figure 4). In the more solidly cellular areas there was considerable pleomorphism and moderate mitotic activity which, taken out of context, would suggest a low grade leiomyosarcoma (Figure 5). The final diagnosis was mesenchymal hamartoma (angiomyolipoma) with low grade leiomyosarcoma.

Discussion

The term hamartoma (Gr. hamartia-defect + oma-swelling) was first described by Albrecht in 1904 to describe tumor-like malformations composed of tissues normally present in an organ but abnormal in arrangement, quantity or degree of maturity.¹ Most renal hamartomas are found in patients with tuberous sclerosis where the incidence varies from 50 to 80 percent, and they are usually multiple and bilateral. Patients with single and unilateral hamartomas usually do not have tuberous sclerosis.² The female to male ratio is 2:1 and most are noted between the third and fifth decade.³ The presentation is usually secondary to hemorrhage within or about the tumor which causes flank pain, fever, signs of a renal mass and occasionally hypovolemic shock.⁴ Spontaneous renal rupture without a history of trauma may occur with massive bleeding limited only by Gerota's fascia.⁵ Hematuria, however, is uncommon. In spite of the frequency of hamartomas in patients with tuberous sclerosis most will remain asymptomatic.

Radiographic Findings

The radiographic findings of renal hamartomas may help to differentiate them from hypernephromas, but frequently this distinction cannot be made. The diagnosis of hamartoma is suggested on the KUB and intravenous urogram by the radiolucent appearance of a large amount of fat which is usually present. Also, the tumor tends to infiltrate and enlarge without distortion of the collecting system. Therefore, the soft tissue mass may seem larger than the deformity of the collecting system would suggest.⁴ Hemorrhage into the fat may obscure these signs.

The general angiographic appearance of hamartomas frequently makes it difficult to differentiate them from hypernephromas. Also, the tumor vessels of both respond identically to epinephrine with a lack of vasoconstriction. Viamontem, how-



Figure 3



Figure 4

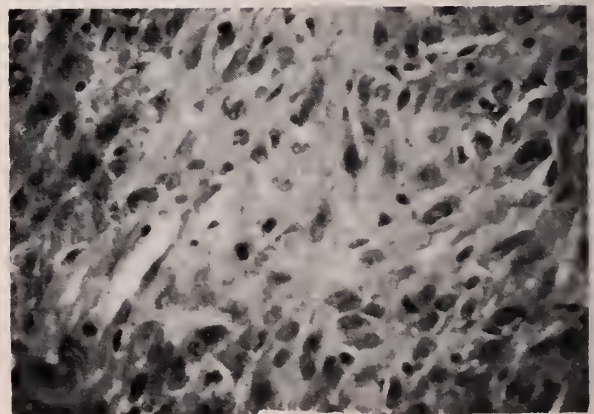


Figure 5

ever, has noted small arterial aneurysms from the interlobar and interlobular arteries which he feels are in definite contrast to the irregular size and contour of hypernephroma vessels.² He also noted that the venous phase develops normally in hamartoma in contrast to the early appearance seen with hypernephromas. Unless there is a large amount of radiolucent fat it still appears, however, that the pre-operative diagnosis of hamartoma would be difficult to make on solitary or multiple unilateral renal masses.

Pathology

The gross appearance of hamartomas is yellow or yellow-grey with or without areas of hemorrhage and necrosis.⁶ It is variable in size, non-encapsulated, infiltrating and consists of fat, smooth muscle, fibrous tissue and blood vessels. In some, the presence of mitosis and pleomorphism suggests malignancy but metastasis has never been reported.⁷ With this histologic picture they are commonly referred to as angiomyolipomas and have been mistakenly called primary sarcomas of fat or smooth muscle.

Management

Our basic management agrees with that of McCullough and Scott.⁶ If a solid renal neoplasm is found in a patient who does not have tuberous

sclerosis, we believe the safest treatment is radical nephrectomy.

If the patient has tuberous sclerosis and a solitary renal neoplasm, then, careful attention must be given to the pre-operative studies. If they suggest hamartoma, one could do a careful open biopsy of the lesion and frozen section being careful to properly pack off the biopsy site should the lesion be diagnosed as a hypernephroma. If the lesion is a hamartoma, either nothing further need be done or, if feasible a partial nephrectomy conserving as much normal renal tissue as possible can be performed.

If bilateral renal neoplasms are present in a patient with tuberous sclerosis, the probability of hypernephroma is very small. We would tend not to operate on such patients unless there was compelling evidence of hypernephroma or other conditions such as severe uncontrolled hemorrhage existed.

Summary

A case of renal hamartoma has been presented. The features of renal angiomyolipomas are described in conjunction with a discussion of their management and the difficulty in differentiating them from renal cell carcinomas.

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His the impartial vision of the great, who see not as they wish, but as they find.
—J. R. Lowell.

I can see how it might be possible for a man to look down upon the earth and be an atheist, but I cannot conceive how he could look up into the heavens and say there is no God.—Abraham Lincoln.

Pediatric Nurse Associate Program

The Pediatric Nurse Associate Program (PNA) at the University of Minnesota began in response to the growing need for primary workers in the field of child health care. For several years, the Master's program had been expanding its clinical courses for public health nursing students. Through this experience it became apparent that the Master's program would have to be changed to accommodate a specialty track in child health care. In June, 1971, the School of Public Health was awarded a five-year special training project grant by the Department of Health, Education and Welfare to prepare nurses to assume a primary care role in ambulatory pediatrics.

The program, under the co-direction of Miss Alma Sparrow, Director of Public Health Nursing and Dr. Robert ten Bensel, Director of Pediatric Ambulatory Care at Hennepin County General Hospital, is in its second year of operation. Seven students were certified as PNAs at the end of the nine month program in June, 1972. Thirteen graduate nurse students are currently enrolled.

The objective of this project is to prepare nurses to care for well infants, children and adolescents. The nursing role is best described as interdependent and collaborative with the physician. The nurse assumes responsibility for providing health care to a well population of infants and children.

The curriculum is designed to provide related didactic and clinical experience concurrently. The didactic content is provided by the medical and nursing faculty at the University of Minnesota for three academic quarters. The clinical experience is obtained in one of six pediatric settings—varying from prepaid-private to public ambulatory clinics:

Children's Hospital—Dr. Carolyn Levitt

Group Health East Clinic—Dr. Byron Johnson

Group Health Medical Center—Dr. Stephen Boros and Dr. John Harkness

Hennepin County General Hospital—Dr. John Tobin, Jr.

St. Paul Ramsey Hospital—Dr. Ray Hippchen

University of Minnesota Pediatric Clinic—Dr. Robert Fisch

Wayzata Children's Clinic—Dr. Mitchell Einzig and Dr. Terril Hart

All clinical settings provide physician and nursing faculty to be available to the student.

The specific objectives are to enable the student: (1) to gain knowledge and skill in medical history taking and physical examination so that she can judge the health status of a child; (2) to integrate these skills with interviewing and counselling so that parents and children receive sensitive and intelligent advice and support; (3) to increase her knowledge in the area of normal growth and development so that she is able to provide age and sex appropriate care; (4) to gain a working knowledge of the general field of child health care so that she will regard and uphold high standards of care to infants, children, adolescents and their families.

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Robert W. ten Bensel, M.D.†

From Division of Public Health Nursing, School of Public Health, University of Minnesota.

*Project Coordinator, PNA Program.

†Pediatric Coordinator, PNA Program.

Meeting

The 33rd Annual Congress on Occupational Health will be held at The Benjamin Franklin Hotel in Philadelphia, September 17-18, 1973.

Retroperitoneal and Mesenteric Xanthogranuloma

An Unusual Malady

JAMES S. MOORE JR., M.D.* AND CHARLES E. WEIGENT, M.D.†

AN INTERESTING MASS of the retroperitoneal space was described by Oberling in 1935.¹ This lesion, which he termed a "xanthogranuloma" had the characteristics of both an inflammatory mass and a neoplastic process.

Case Report

An 80-year-old white man was seen at Minneapolis Veterans Hospital in May 1971 with a two-day history of mild abdominal pain. Past history included a subtotal prostatic resection for benign hypertrophy and medical management for mild hypertension.

Physical examination disclosed a smooth firm mass fixed in the umbilical region. The mass measured 13 cm in diameter, was slightly tender, but did not pulsate.

Extensive laboratory data including blood sugar, white cell count, serum cholesterol and serum proteins were normal. Urinalysis revealed a mild pyuria and *Proteus mirabilis* was obtained on culture.

Plain films of the abdomen were unremarkable. Upper gastrointestinal series demonstrated displacement of loops of small bowel from the umbilical region (Figure 1). The mucosa appeared normal and no intrinsic pathology was demonstrated. Barium enema was normal. Intravenous urogram excluded a renal mass or displacement but showed evidence of chronic infection of the right kidney.

Pathology Report

At surgery the abdomen was explored through a mid-line incision. An irregularly lobulated, firm, yellow mass was found within the root of the small bowel mesentery (Figure 2). It measured approximately 12cm x 7cm in size. The mass incorporated the large vessels and a resection was not attempted. A biopsy was taken for microscopic examination. The patient tolerated the procedure well.

The biopsy consisted of a piece of yellowish tissue measuring 2.5cm x 1cm x 1cm. An area at one end was more firm and of a pale yellow color in contrast to the more obviously fatty tissue at the other end. Micro-

scopic examination revealed a polymorphous appearance (Figure 3). Collections of histiocytoid cells ("facultative fibroblasts") were seen (Figure 4). These cells generally had oval or reniform vesicular nuclei. The nuclei showed

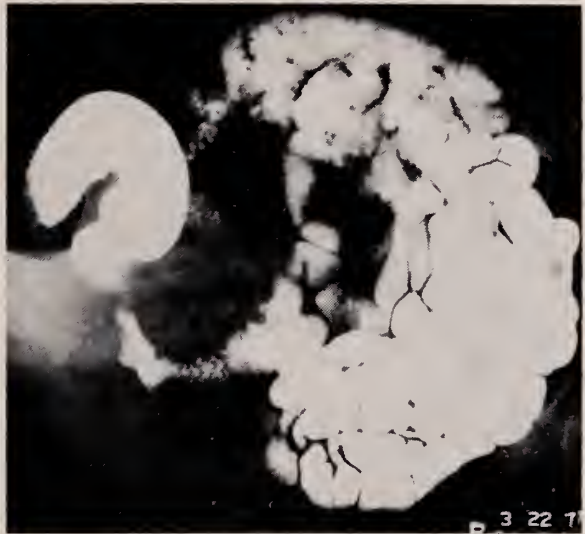


Fig. 1—Large mass in the midepigastria region is seen displacing bowel loops.

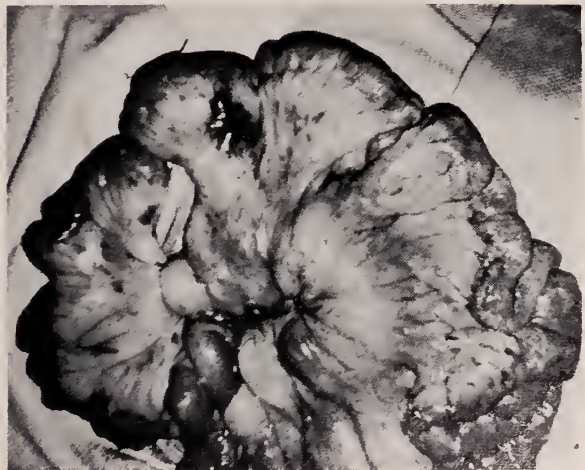


Fig. 2—Mass in root of small bowel mesentery.

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†Clinical Instructor, Mayo Graduate School of Medicine and Department of Pathology, Minneapolis Veterans Hospital.

See editorial, page 301.

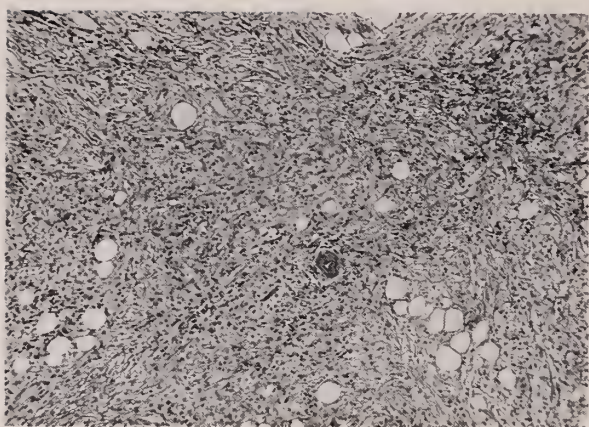


Fig. 3—Fibrous proliferation, lipid laden macrophages and inflammatory cells giving polymorphous appearance.

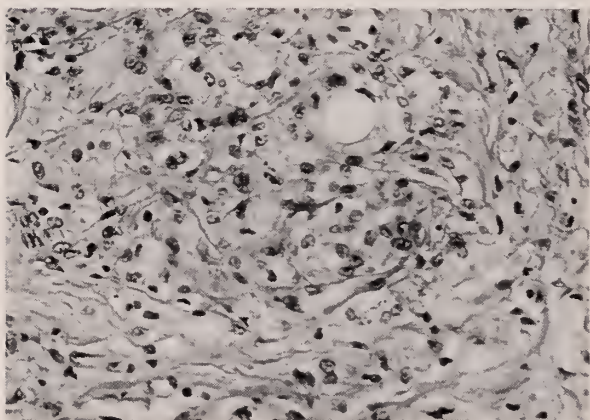


Fig. 4—Histiocytoid cells (facultative fibroblasts) in lesion.

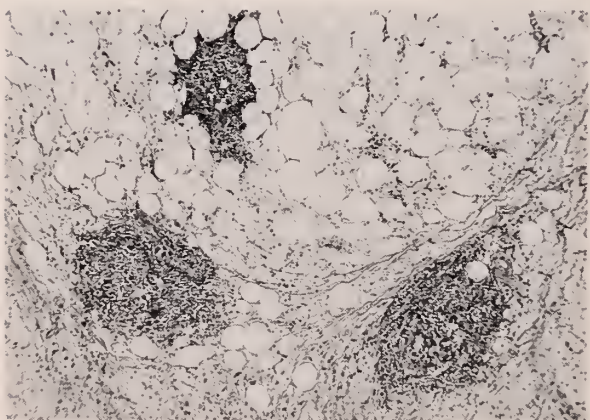


Fig. 5—Margin of lesion with lymphoid follicles and foam cells extending into adjacent fat.

mild pleomorphism and an occasional mitotic figure was found. Rare multinucleated cells were seen. Surrounding and interspersed with these areas were zones of proliferating fibrous connective tissue infiltrated by numerous inflammatory cells and groups of lipid-laden macrophages. Polymorphonuclear leukocytes, lymphoid cells, and collections of plasma cells were seen. Eosinophils were conspicuous by their absence. Some small, thick-walled blood vessels showing prominent endothelial proliferation were noted. About the irregular margin of the lesion, there were some lymphoid follicles and numerous lipid-laden macrophages were seen extending along the septi and within interstices of the adjacent fatty areolar tissue (Figure 5). Fat stains showed the macrophages to be laden with neutral lipid droplets.

Incidence

Including Oberling's original reports¹ approximately twenty-seven cases of xanthogranuloma of this region have been reported in the English literature.²⁻¹¹ The exact number is difficult to determine because of the unpublished reports, foreign reports and duplication of some case reports. Primary tumors of the retroperitoneal space are quite rare and primary benign tumors are even more unusual. A review of the literature reveals that of 213 cases of primary retroperitoneal tumors only 31 were benign.^{12,13,14} No xanthogranulomas were reported. This may be due, in part, to lack of recognition or to confusion regarding the pathologic characteristics.⁹

Supporting this contention is Stout's series of 81 benign primary retroperitoneal and mesenteric tumors of which there were five xanthogranulomas.⁹ Pack's series of 17 benign lesions of this region included three xanthogranulomas. In a series of 44 solid primary tumors of the mesentery reported by Stout, xanthogranuloma accounted for six cases.¹¹ It is interesting to note that in the last two series mentioned above, xanthogranuloma was the second most common lesion.

Pathology

The Armed Forces Institute of Pathology considers this lesion to be a variant of the fibrous histiocytoma group of tumors.¹⁵ This group also includes sclerosing hemangioma, villonodular tenosynovitis and fibrous xanthoma. The common factor in each of these diverse conditions is the histiocyte. As described by Pear,¹⁶ the histiocyte is a multipotential cell which participates in phagocytic activity. When lipids are phagocytized, it becomes a xanthoma cell. The histiocyte may participate in systemic disease (histiocytosis X) or granulomatous reactions (xanthogranulomatous

pyelonephritis), or may produce a localized neoplastic response, (xanthogranuloma, villonodular tenosynovitis).

Originally Oberling¹ considered xanthogranuloma to be a localized extraosseous manifestation of Hand-Christian-Shuller disease. Some support to this theory has been offered by the report of a case of xanthogranuloma associated with eosinophilic granuloma.⁶ Jaffe has demonstrated however, that eosinophilic granuloma heals by resolution and not by transformation into a xanthogranuloma.¹⁷

Electron microscopic studies suggest that the xanthogranuloma is primary a myoangioma, the endothelium of which is abnormally permeable to cells and lipids.⁴ This observation has not yet been confirmed by other investigators.

Others have suggested that the lesion represents basically an inflammatory response since in several instances it has clearly followed a nidus of chronic infection.^{10,18} Xanthogranulomatous pyelonephritis has been shown to follow suppurative processes of the kidney and it has been emphasized that retroperitoneal extension of this process is microscopically similar to primary retroperitoneal xanthogranuloma.¹⁹

Xanthogranulomatous processes have been reported to occur in the lung,²⁰ stomach,²¹ ovary,¹⁸ and colon²² but because of their extreme rarity, they are usually not included in the differential diagnosis of lesions involving these organs.

Diagnosis

The diagnosis of retroperitoneal xanthogranuloma has never been suggested preoperatively. The following may be helpful clues:

1. While primary retroperitoneal processes (including xanthogranuloma) may occur in any age

group, all of the reported cases of primary mesenteric xanthogranuloma have occurred in the older (60-80) age group.^{11,2} Primary solid tumors of the mesentery of the other origins (spindle cell, etc.), on the other hand, tend to occur in a younger group.¹¹

2. Characteristic radiographic finding of the more common mass lesions such as the radiolucency of a lipoma^{23,24} or the "tacked down" appearance of metastatic carcinoma²⁵ are absent.

3. A nidus of chronic infection is present.

Treatment

Treatment has been primarily surgical. However, because of its location, complete removal is often impossible and recurrences are not uncommon.^{7,11,4} Radiation therapy has been attempted in many cases of retroperitoneal xanthogranuloma, including a few in Oberling's original series. Although said to be radiosensitive, poor documentation of dosages and tumor response has made evaluation of this form of treatment difficult. In two recently reported cases an excellent response was obtained using 3700 rads¹¹ and 3950 rads⁸ respectively. In the first case some recurrence of the tumor was noted during the first two years. The patient was free of tumor thereafter.

Summary

Xanthogranuloma of the retroperitoneum and mesentery is a rare tumor, and the radiologist is often called upon for diagnostic assistance. There are no specific or characteristic radiographic signs, but the lesion should be included in the differential diagnosis of solid lesions involving this area, especially in an older patient. In addition, the radiotherapist should be aware of its radiosensitive nature.

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- 19-25 Will be found on page 289.

Persistent Truncus Arteriosus

Report of Survival to Age of 52 Years

JOHN B. CARTER, M.D.; LEONARD C. BLIEDEN, M.B.,B.Ch. AND
JESSE E. EDWARDS, M.D.

PERSISTENT TRUNCUS arteriosus is a relatively uncommon congenital malformation of the cardiovascular system. In only exceptional cases does the patient survive beyond infancy or childhood. To our knowledge, only six cases have been reported in which survival occurred to or beyond the third decade, the longest survival being to the age of 43 years. We have studied a patient with persistent truncus arteriosus who lived to the age of 52 years. The rarity of this phenomenon serves

as the basis for placing this case on record.

Case Report

Clinical Features

The patient was a 52-year-old, single, semi-invalid, white woman, hospitalized in a state of progressive congestive heart failure. Her medical history was complex. She was not described as having been a "blue baby" and her physical activity reportedly had not been restricted in early years. An episode termed "inflammatory rheumatism" occurred at the age of five years and subsequently the patient remained a semi-invalid.

At the age of 26 years, following an episode of scarlet fever associated with polyarthralgia, persistent deformities of the knees, hips and elbows resulted. Later in that year, an illness considered to be bacterial endocarditis was associated with episodes of cerebral embolism.

Cardiac catheterization and forward angiocardiography

From the Department of Pathology, United Hospitals, Inc.-Miller Division, St. Paul, Minnesota and the Departments of Pathology and Pediatrics, University of Minnesota, Minneapolis, Minnesota.

This study was supported by Public Health Service Research Grant 5 R01 HL05694 and Research Training Grant 5 TO1 HL05570 from the National Heart and Lung Institute.

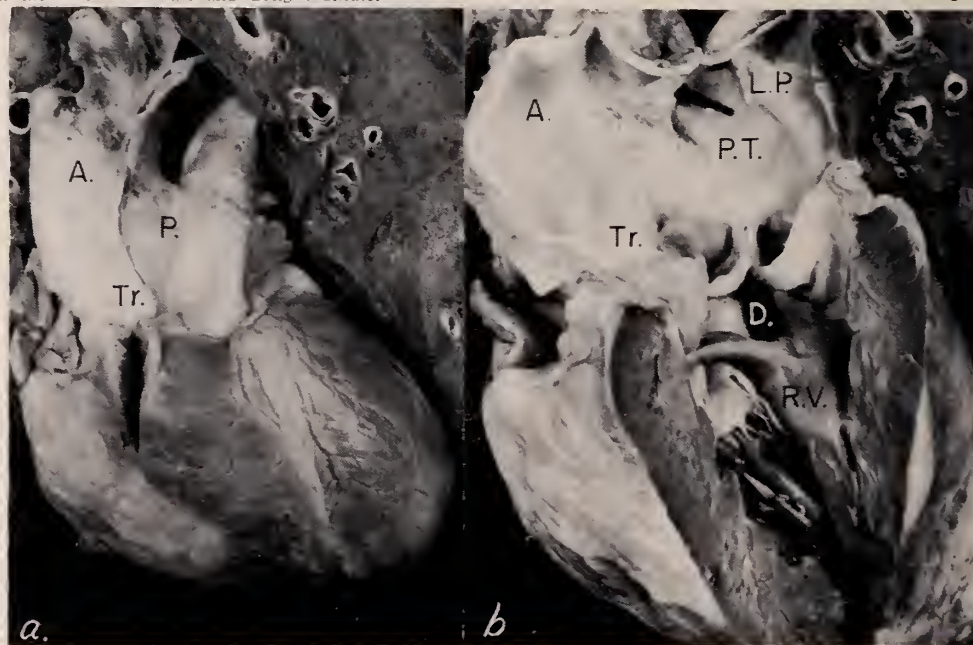


Fig. 1—*a.* Exterior of heart and great vessels viewed from in front. Arising from the base of the ventricular portion of the heart is a wide single artery representing the truncus arteriosus (Tr.). The aforementioned vessel divides into the aorta (A.) and the pulmonary arterial system (P.). *b.* Interior of right ventricle (R.V.) and great vessels. Above a ventricular septal defect (D.) the truncus (Tr.) arises from both ventricles. The truncus arteriosus branches into the ascending aorta (A.) and into a short pulmonary trunk (P.T.) from which the right (probe) and left (L.P.) pulmonary arteries arise. Thickening of the three cusps of the truncus valve with mild degrees of prolapse.

were performed in 1950 when the patient was 32 years old. The aortic pressure was 140/80 mm., Hg; the right ventricular pressure was 120/0 mm., Hg. The level of oxygen saturation of aortic blood was 78 percent. A forward angiogram revealed passage of opaque material from the right ventricle into the aorta. The diagnosis of ventricular septal defect and overriding aorta was made and the situation was termed, "Eisenmenger complex." Subsequent angiocardiographic studies were not performed. There followed many hospital admissions, including treatment for ulcerative colitis, multiple urinary tract infections and nephrectomy for renal calculi.

Physical examination at the age of 52 years revealed prominent cyanosis, clubbing of the digits and dyspnea at rest. The brachial blood pressure was 150/60; the pulse rate was 92 beats per minute and the rhythm regular. The apical beat was palpated in the left fifth intercostal space in the anterior axillary line. There was a grade II/VI systolic ejection murmur at the left sternal border and a grade I/VI basal diastolic murmur radiating to the apex. There were bilateral pulmonary rales. The liver was enlarged and tender.

The electrocardiogram revealed right ventricular hypertrophy with first degree AV block. The concentration of hemoglobin in the blood was 17.4 gm./100 ml. The thoracic roentgenogram revealed marked cardiomegaly and prominent hilar vessels bilaterally. Infiltrates were present in each lower lung field. Other laboratory studies were noncontributory. In spite of treatment with bedrest and appropriate medication, the heart failure was unrelenting and the patient died three days after admission at the age of 52 years.

Pathologic Findings

Autopsy disclosed the heart to weigh 525

grams. The right ventricle averaged 12 mm. in thickness and the left averaged 16 mm. in thickness. There was a large defect of the superior aspect of the ventricular septum, above which a single arterial vessel (truncus) arose from both ventricles (Figure 1). The truncus valve was composed of three cusps. Each showed moderate thickening and redundancy of tissue with mild prolapse. There were two coronary arteries showing a normal pattern of distribution. The left coronary arterial system originated from the posterior truncal sinus. The width of the single vessel leaving the ascending aorta was 4.2 cm. Approximately 1.5 cm. above the lower level of the truncus valve, the vessel divided into two; the one toward the right continued as the ascending aorta, while the one from the left was extremely short and almost immediately terminated by branching into the left and right pulmonary arteries. The orifice of the common pulmonary trunk measured 3.5 cm. in diameter. The main pulmonary arteries averaged 2.4 cm. in diameter at their origins.

There were two atrioventricular valves, each showing moderate fibrous thickening of the leaflets and chordae. No vegetations or deformities which could be attributed either to rheumatic disease or healed bacterial endocarditis were encountered. Foci of atherosclerosis were present in the aorta and in the major pulmonary arteries and their

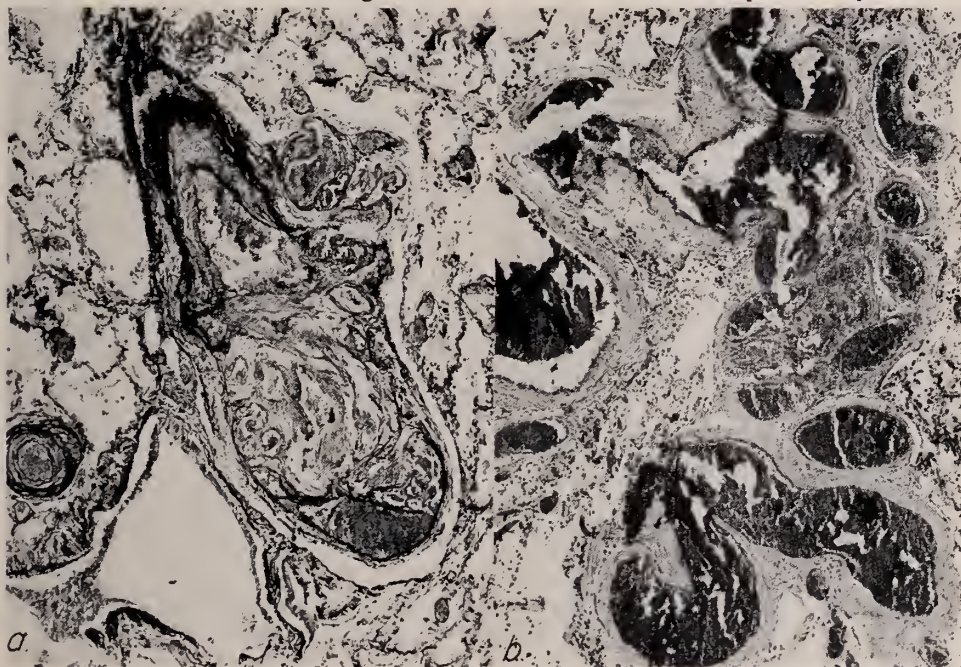


Fig. 2—Photomicrographs of pulmonary arterial vessels. (a.) A large muscular artery shows a plexiform lesion. Elastic tissue stain; x 56. (b.) Numerous dilated arterial vessels are characteristic of "dilatation lesions" of hypertensive pulmonary vascular disease, grade V. Elastic tissue stain; x 42.

elastic branches. Small (200 ml.) pleural effusions were present bilaterally. Chronic passive congestion of the spleen and liver was present. The remainder of the findings were nonspecific, save for the solitary left kidney which weighed 295 grams as a result of compensatory hypertrophy.

Histologic examination of the lungs showed hypertensive pulmonary vascular disease, grade V according to Heath and Edwards.¹ This was characterized by the presence of numerous plexiform and angiomatoid lesions (Figure 2). Extensive dilatation of muscular pulmonary arteries was noted. The pulmonary trunk showed an aortic pattern of elastic tissue indicative of pulmonary hypertension from birth.² Extensive atherosclerosis was present in the elastic branches, as were foci of cystic medial necrosis and medial calcification.

The pulmonary parenchyma showed evidence of severe chronic congestion and edema of the alveolar septa secondary to prolonged ventricular failure. Renal histology showed marked and uniform increase in glomerular size and cellularity consistent with glomerular changes in cyanotic congenital heart disease.³

Comment

In general, the prognosis in truncus arteriosus appears to be dependent upon two factors, namely: (1) the presence or absence of pulmonary stenosis and (2) secondary anatomic effects upon the small pulmonary arterial bed.

When no pulmonary stenosis is present, there are large volumes of pulmonary flow with ultimate deleterious effects upon left ventricular compensation. Such patients tend to succumb as young infants.⁴ This applies to the majority of patients with persistent truncus arteriosus. When there is no obstruction to pulmonary flow, the average survival is less than one month.⁴ Death at this early age is usually the result of markedly in-

creased pulmonary blood flow and subsequent left ventricular failure. These cases are types I, II or III,⁵ in which, large, unobstructed pulmonary arteries arise directly from the proximal truncus.

Cases in which there are no pulmonary arteries (type IV) have a somewhat longer average survival of five years. In this situation, pulmonary circulation is through bronchial arteries. These smaller vessels serve as an obstruction to high levels of pulmonary flow.

To our knowledge, only six other cases of persistent truncus arteriosus with survival beyond the third decade have been reported.⁶⁻¹¹ In four of these six, there was no stenosis in the major pathways for the flow of blood to the lungs.^{6-8,11}

In the fifth case,¹⁰ the malformation was of type IV (pulmonary arterial supply by bronchial arteries). The sixth case⁹ showed a large right pulmonary artery, while the left pulmonary artery was absent. The left lung was supplied by a bronchial arterial branch from the aortic arch.

The present case is that of a 52-year-old woman with type I truncus and severe hypertensive pulmonary vascular disease. It is possible that retention of thick-walled, fetal type pulmonary arteries may serve as a protection against excessive pulmonary flow and ensuing heart failure as suggested by Hicken and associates.⁷ The basis for the development of such lesions in some and death in infancy in others is uncertain.

Summary

A case is presented of persistent truncus arteriosus in a woman who died at the age of 52 years which, to our knowledge, is the longest reported survival with this malformation. The literature on long-term survival with persistent truncus arteriosus indicates that six other cases are on record in which the patient lived longer than 30 years.

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Juvenile Nasopharyngeal Angiofibroma

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JUVENILE NASOPHARYNGEAL angiofibroma is an uncommon tumor of the nasopharynx. Although non-metastasizing and histologically benign, it has the capacity for locally destructive growth and fatal hemorrhage. Several hundred cases have been described in the literature, but the exact incidence is unknown. The following case is illustrative of important aspects of this neoplasm.

Case Report

A 15-year-old boy was referred to the University Hospitals in April, 1971, after a biopsy of a left posterior nasal mass showed a nasopharyngeal angiofibroma. Repeated epistaxis and nasal obstruction had been present since November, 1970. The tumor was easily visible in the nose and nasopharynx and a convex mass was palpable in the left cheek. A left serous otitis media was noted secondary to eustachian tube obstruction. Skull Xrays, sinus films, and laminograms of the paranasal sinuses (Figure 1) suggested extensive posterior and lateral extension of the tumor with involvement of the sphenoid, left ethmoidal and maxillary sinuses, and encroachment into the area of the pterygomaxillary fossa. Carotid angiography demonstrated tumor vessels from the cavernous portion of the left internal carotid and ophthalmic arteries, and extensive vascular supply from both external carotids via the internal maxillary arteries (Figure 2).

Estrogen therapy (diethylstilbesterol,† 5 mg t.i.d.) was employed following which the patient was noted to have less bleeding as the tumor regressed in size. After six months the tumor again appeared to be growing, and the patient was readmitted in October, 1971, for surgery. Following a left external carotid artery ligation, the tumor was removed through a tripartite intraoral approach (Figures 3 and 4). The transpalatal, transmaxillary, and retromaxillary dissection provided ideal exposure of a large, lobulated mass in the posterior left nasal cavity, nasopharynx, and sphenoid sinus. A narrow segment passed through the pterygomaxillary fossa and spread into the infratemporal region (Figure 5). It was completely removed with blunt dissection and a blood loss of 2000 cc. The patient has had no recurrence and is free of functional and cosmetic defects.

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See editorial, page 299.



Fig. 1—Water's view of skull demonstrates tumor mass in left cheek.



Fig. 2—Angiogram. Arrow shows tumor's rich vascularity.

Discussion

In 1947, Chelius first described a "fibrous nasal polyp which commonly occurs in persons about the time of puberty," and was followed by the report of Gosselin in 1876 who noted a tendency of this tumor to undergo spontaneous regression after sexual maturity.¹ In 1906, Cheveau suggested the name "Juvenile Nasopharyngeal Fibroma,"² and Friedberg³ popularized the term "Angiofibroma" in 1940. The tumor is commonly recognized as a lesion of adolescent males,^{4,5,6} while occasional reports of its existence in females^{7,8,9} and at extremes of life^{8,10,11} are known.

The lesion has also been located as a primary growth in the paranasal sinuses.¹²

Various theories of pathogenesis have been postulated to explain the peculiar occurrence of this neoplasm, including derivation of the tissue from pharyngobasilar fascia and cartilage.^{13,14,15} Perhaps the most intriguing theory is that proposed by Schiff,¹ who felt that the tumor is a growth response to an ectopic focus of vascular tissue distributed as a hamartoma in the nasopharyngeal periosteum during embryologic development. This tissue is likely related to mucosa of the inferior turbinate which has been shown to be responsive to sex hormones, especially during adolescence. Development of this lesion would then begin with the altered pituitary axis and hormonal changes of puberty.

The diagnosis of nasopharyngeal angiofibroma is suggested when a teenage boy presents with nasal obstruction and epistaxis. Conley's¹⁶ analysis of 38 patients showed 90% had unilateral or bilateral nasal obstruction and 70% had a history of epistaxis. Additional findings, suggestive of more advanced disease, are eustachian tube blockage with secondary hearing loss, secondary infection of the paranasal sinuses, and deformity of the cheek, palate and orbit. Eighty-four percent of Conley's patients presented with symptoms in the juvenile age group. The clinical behavior of this tumor is such that symptoms may be minimal if it remains confined to a small area of the nasopharynx without excessive bleeding. The presentation of symptoms in adults may reflect a lack

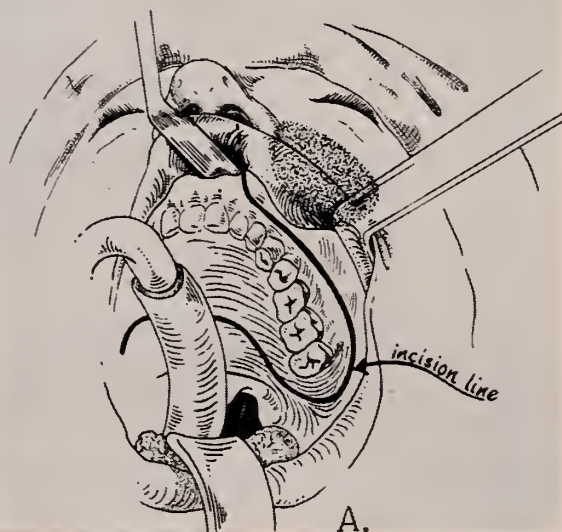


Fig. 3—Outlines incisions used in surgical approach.



Fig. 4—Indicates extent of surgical dissection on skull model.

of clinically significant growth until later years.

Mirror examination of the nasopharynx usually demonstrates a smooth, nodular, firm mass bulging in one or both sides of the nasopharynx with extension into the nasal cavity.^{9,16} Color varies from grey to purplish-red and there may be ulceration and secondary infection. Attachment of the tumor is usually broad but pedicle growth has been described.^{9,10} These findings in the usual clinical setting are enough to suggest the diagnosis without biopsy. If so, angiography, as with carotid body tumors, may confirm the diagnosis. When tissue is needed, biopsy is best performed in the hospital in anticipation of severe hemorrhage.^{1,9,16} Differentiation from enlarged adenoids or polyps is not difficult on physical findings. Less common lesions likely to be found in this region include the simple fibroma, chordoma, mucous or minor salivary gland tumor, dermoid cysts and teratoma, esthesioneuroblastoma, fibrosarcoma, and carcinoma.^{1,2,9}

Roentgenographic examination is useful not only in the diagnosis of this neoplasm but also in determining the extent of its growth and blood supply. Sinus and skull Xrays will demonstrate soft tissue mass and bony destruction or displacement. Holman and Miller¹⁷ reported anterior bowing of the posterior wall of the maxillary sinus as particularly suggestive of this tumor. Often the full extent of the lesion is underestimated unless laminograms are employed. The assessment of blood supply by angiography may indicate the usefulness of external carotid artery ligation prior to surgical removal. Treatment of the tumor is tempered by the usually accurate assessment that this lesion is a histologically benign neoplasm of

the pubescent period, causing varying symptoms, with a tendency to less activity and spontaneous regression upon attainment of sexual maturity.^{1,9,16,18,19} Many of these tumors probably go completely unrecognized. Some authors^{11,18,19} feel complete spontaneous regression never occurs, and to wait for the expected involution is to invite serious complication. The invasive growth potential and troublesome hemorrhage and nasal obstruction clearly justify removal of these tumors.

In 1948, Martin⁴ reported on 29 cases over a 20-year period. All of his patients were limited to young males, many with the clinical notation of sexual underdevelopment. He concluded that interstitial (radon seed) therapy was of no value if the lesion exceeded 5 cms in size and carried a significant chance of dangerous bleeding both from insertion and tumor necrosis. He did employ radiation with some success but could not define the optimal tumor dose. As little as 1500 rads were shown to cause facial deformity in one case, and he concluded that this form of treatment was best reserved for patients 18 years of age or older. Martin felt surgical exposure was fraught with the potential of dangerous bleeding and afforded poor tumor exposure. He recorded several instances of a decrease in tumor vascularity with androgen therapy and concluded that hormonal and radiation treatment should be considered primary therapy while anticipating possible spontaneous regression.

Several years later, Figi and Davis,⁹ reviewing 114 cases from the Mayo Clinic over a 40 year period found most of their patients had been treated with a combination of surgery and/or radiation and 42 of the 51 cases treated after 1940 included interstitial radiation plus electrocoagulation. In these latter cases they employed such surgical procedures as transpalatal and transantral exposure of the tumor to facilitate electrocoagulation and radon insertion. They commented that radiation treatment, particularly external, carried a risk of damage to growth centers of the face in the younger patient.

In 1959, Schiff¹ reviewed various therapeutic measures and found both local chemical therapy with sclerosing agents and radon application carried a high risk of secondary severe hemorrhage. In his opinion, external radiation was useful but not indicated before full growth of the facial bones. He employed electrocoagulation successfully in treating small recurrences. Schiff advanced the

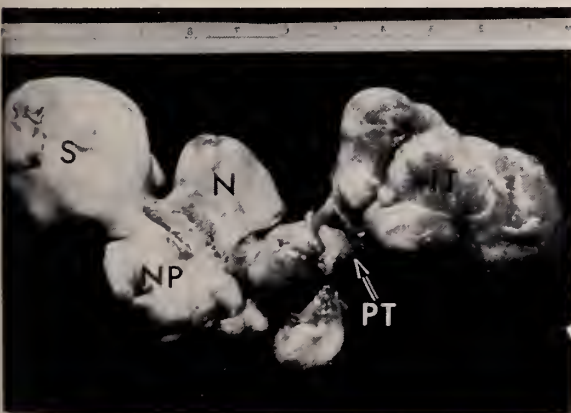


Fig 5—Characteristic tumor lobulations: Sphenoid (S); Nose (N); Nasopharynx (NP); Pterygomaxillary Fossa (PT); Infratemporal Fossa (IT).

knowledge of the hormonal relationships of this tumor and demonstrated microscopic and clinical evidence of decreased tumor vascularity with estrogen therapy. He found a similar but less dramatic response with testosterone. He concluded, however, that there was no substitute for surgical extirpation. Interestingly, Schiff noted that three-quarters of his patients were red-haired, a finding increasingly recognized at our institution.

In 1965, Apostol and Frazell²⁰ continued the survey of this lesion at the Memorial Center in New York that had earlier been reported by Martin. Again they found universal occurrence in adolescent males and went so far as to suggest chromosome studies for those females reportedly afflicted by this tumor. They noted that only one of Martin's patients treated with testosterone showed clinical evidence of tumor regression. The behavioral side effects of this drug prompted its deletion from further use at that institution. They found no relationship between the age of onset and symptomatology, and could find no clinical or laboratory evidence for sexual underdevelopment. Their follow-up of those tumors treated by radiation indicated temporary regression of the lesion with significant morbidity and one long-term example of post-radiation induced carcinoma. They employed estrogen therapy as a useful pre-operative means of decreasing tumor vascularity, and felt surgical therapy was the most useful primary means of treatment. Conley¹⁶ is in agreement with this and cited several serious complications of radiotherapy including radionecrosis of the maxilla requiring maxillectomy and post-radiation induced squamous cell carcinoma of the face and orbit. He also could find no evidence of endocrine disturbance.

Surgical Approach

A comprehensive surgical armamentarium is mandatory to effectively treat these tumors. We advocate a tripartite approach. Lesions confined to the nasopharynx are well exposed from a *transpalatal approach*, as are extensions into the sphenoid sinus and posterior choanae. Almost invariably the major blood supply to such tumors is from the internal maxillary artery. Angiography confirms which side affords the chief vascularity. It is then useful to employ transantral (*transmaxil-*

lary approach) ligation of the internal maxillary artery in the pterygomaxillary fossa. The Caldwell-Luc antrostomy can be extended through the lateral nasal wall (Denker modification), for exposure of tumor residing in the more anterior nasal cavity or ethmoids.

Lateral tumor extension into the cheek, as in the case presented, is not unusual and is the most difficult to remove. Proponents^{21,22,23,24} of external incisions in the face or neck are countered by others^{25,26,27} preferring additional intraoral exposure. The *retromaxillary approach* to the pterygoid plates and pterygopalatine fissure is unsurpassed for exposure and minimal morbidity. In these situations where the internal maxillary artery is obscured by tumor, ligation of the external carotid artery may be elected.

Each of these three approaches may be used separately or in combination depending upon the location and extent of the tumor. In some situations the addition of cryosurgery has been helpful.^{11,26} We routinely use estrogens for pre-operative shrinkage of the tumor blood supply. This has been confirmed by obtaining repeat angiograms following hormone administration. Continued hormone therapy and radiation may prove helpful in the event the tumor is unresectable.

Pathology

Sternberg⁶ has reviewed the pathology of those cases from the Memorial Center previously reported by Martin⁴ and Apostol.²⁰ The vascular network displays venules and capillaries of varying caliber with a distinctive lack of elastic tissue and usually only a simple endothelial lining. The capillary bed often directly opposes the intact surface epithelium, explaining propensity to bleed. The epithelium is largely respiratory except in areas of ulceration or squamous metaplasia, and as the tumor expands a pseudocapsule may be formed. The connective tissue stroma is made up of fine and coarse collagenous fibrils interweaving in an irregular manner. Sternberg believes the stellate shape of the stromal cells is characteristic and that the histology of this neoplasm is quite distinctive. McGavran,⁵ utilizing the electron microscope, noted intranuclear dense bodies in these stromal cells or fibrocytes which he feels are unique to this particular tumor.

Reference 1-27 will be found on page 292.

Tracheobronchial Lavage in Small Infants

MARTHA BURKE-STRICKLAND, M.D.*

THOUGH TRACHEOBRONCHIAL LAVAGE is recommended in the management of adult lung disease,^{1,2} there has been little documentation of its use in small infants and children. While impedance to flow offered by the small bronchioles of children may preclude use of tidal lavage of the whole lung,³ there are many situations in which lavage of just the trachea and large bronchi may be helpful. Results of studies on three infants presented indicate that lavage of the trachea and bronchi with small quantities of saline may be used without significantly impairing ventilation of the infant.

Case Reports

Case 1

The patient was a 5 kg, three month hydranencephalic male infant with bronchitis. His temperature had ranged from 100° to 102°F rectally for eight days. Thick tenacious secretions were poorly handled with a resulting cough that often ended in gagging and vomiting. Coarse shifting rhonchi were heard bilaterally. The chest Xray showed slight increase in markings in the right upper lung field. Xenon 133 studies of pulmonary function showed some possible air trapping in this same area; however, the radiologist felt that slow injection of the Xenon may have produced this as artifact. Baseline arterial blood studies obtained while the infant was breathing air and after 15 minutes of 100% oxygen are summarized in Table 1. He was then intubated, suctioned to remove loose secretions and the tracheobronchial tree lavaged with saline. On the first wash, 10 ml of saline were injected into the endotracheal tube per syringe and needle. A #8F catheter was then inserted and suction applied. Though only five to 10 seconds elapsed, only 2 ml of saline were recovered. On the second and third wash the saline was injected per catheter. Using the same syringe and catheter, withdrawal suctioning was begun at the same instant injection was complete. Recovery was 7.5 and 8 ml respectively. It was estimated that 12-13 ml of saline had been left in the lungs by the three washes. Much thick white mucus was removed by suctioning and spontaneous coughing after the lavage.

Repeat blood studies immediately after the lavage, while he was breathing room air, showed a decrease in

the pO_2 as well as a decreased response to breathing 100% oxygen (Table 1). There appeared to be no inhibition to blowing off CO_2 since both pH and pCO_2 reflected the hyperventilation of crying. Chest sounds were improved, follow up Xenon studies 45 minutes after lavage showed no air trapping, and the conventional chest Xray remained unchanged.

Cultures of saline recovered from the lavage grew out alpha streptococci and pneumococci. A simultaneous nasopharyngeal culture yielded "normal flora" and culture of a needle biopsy of the right upper lobe was negative. There were no apparent complications from the needle biopsy⁴ or the saline lavage. Though no antibiotics were given, clearing the airway of its tenacious secretions appeared to improve his well-being. His temperature abated and recovery was complete within another week.

Though saline lavage did seem to facilitate removal of large quantities of mucus with no clinical cyanosis or air trapping in this first infant, he did suffer a transitory drop in pO_2 . The decrease was not significant in this instance since the arterial pO_2 did not drop below the safe level of 40 mm Hg. Such a decrease in ventilation could have devastating consequences when added to a more seriously compromised lung function, although it is just such infants in the delivery room or newborn intensive care unit that need the tracheobronchial lavage. In this infant, poor recovery of saline initially had left a residual equal to 8% the infant's estimated lung volume.⁵ It was felt that the improved recovery of saline offered by the modification of technique would minimize the risk of even transitory depression of ventilation by residual saline in the lungs. Studies in the other two tends to confirm this impression.

Case 2

The patient was a 1,700 gram male premature transferred to the newborn intensive care unit at 40 hours of age with moderately severe respiratory distress syndrome. With continuous positive pressure breathing (CPPB) respirator assistance and 90% oxygen his blood pH was 7.28, pCO_2 55 mm Hg and pO_2 58 mm Hg. At 47

TABLE I
Blood Values Before and After Lavage of Case 1
While Breathing Room Air After 15 min. of 100% O_2

	pH	pCO_2 mm Hg	pO_2 mm Hg	pH	pCO_2 mm Hg	pO_2 mm Hg
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Before Lavage	7.38	22	122	7.55	14.7	284
After Lavage	7.45	15	53	7.51	17	247

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See editorial, page 299.

hours he suffered severe shock and cardiac arrest when tension pneumothorax developed bilaterally. Resuscitation was successful and relief of the pneumothorax was obtained with closed chest tube drainage. Following this episode, chest Xray showed increased opacification. Resolution was slow and complicated by congestive heart failure and recurrent inspissation of secretions after extubation. Early failure was heralded by an enlarging liver on the sixth day. Response to lanoxin was poor and by the seventh day he had a gallop rhythm, loud ductus murmur and dependent edema. Lasix and an increased dose of lanoxin gave some response; however, he was not considered out of failure for another five days. Several times during these precarious days, his condition appeared further compromised by secretions that could not be removed by chest percussion, postural drainage and suctioning. The blood studies before and after lavage on these occasions are recorded in Table 2. In this infant each lavage procedure consisted of three washes of three ml each. There was a drop in pO_2 after the second lavage as well as increased cloudiness on chest Xray. Clinically his color remained good during the procedure and his respirations were less labored after the lavage. This episode occurred on the day that congestive heart failure was at its worst. Also, in reviewing the situation, it was learned that the revised technique had not been used for injecting and removing the saline. Recovery of saline was only 30% leaving behind about six ml or 6% of the estimated lung volume. In the other instances when the revised technique was used and recovery of saline 70-80%, all parameters showed improvement after lavage. The residual amount of saline left in the lung on these occasions was estimated to equal about 3% of the lung volume.

Early cultures taken from the pharynx and saline retrieved from tracheal lavage both grew out coagulase negative staphylococcus. Dicloxacillin 200 mg/kg was started. By the fifteenth day, the recurring right upper

lobe atelectasis secondary to inspissated secretions was responding to percussion, postural drainage and suctioning. No more lavages were performed. Recovery proceeded uneventfully.

Case 3

The patient was an 1,890 gram meconium stained premature whose Apgars of six and four at birth were followed by grunty, rapid respirations and cyanosis. By the time he was transferred to the intensive care unit at nine hours of age his chest Xray was completely opacified. During the course of CPPB therapy he developed a tension pneumothorax requiring closed chest tube drainage. An ambient oxygen above 40% was required for four days, and the expected bronchopulmonary dysplasia developed during his recovery phase. The attendant scanty production of thick viscid mucus led to recurrent plugging of the bronchi and bronchioles that did not respond to ordinary tracheobronchial toilet and suctioning care. Table 3 summarizes the blood studies immediately before and after lavage on four different days. Recovery of three ml portions of saline x3 was 70-80% on each occasion using the technique of lavage as outlined. Much thick white tenacious mucus was obtained at suctioning during and after lavage. With $F_{I}O_2$ remaining the same, the blood pO_2 improved on each occasion after lavage. Residual amount of saline left in the lungs on each occasion was estimated to be equal to 3-4% of lung volume.

Cultures of saline aspirated at the fourth lavage grew coagulase negative staphylococcus (the first three were negative). This responded to methicillin. While the infant continued to need a moderately increased $F_{I}O_2$ for several weeks, secretions appeared adequately handled without further lavage.

Discussion

Tracheobronchial lavage with saline appeared to facilitate removal of inspissated secretions in

TABLE 2
Studies Before and After Lavage of Case 2

		Blood			Xray after lavage	Condition after lavage
		pH	pCO_2	pO_2		
Day 6	Before Lavage	7.34	57	53	Improved	Large amounts of secretions removed, respirations easier, chest sounds improved
	After Lavage	7.37	57	84		
Day 7	Before Lavage	7.29	63	80	Worse	Large amounts of secretions removed, much improved
	After Lavage	7.37	57	58		
Day 8	Before Lavage	7.47	42	35	None taken	Large amounts of secretions removed, baby appeared improved
	After Lavage	7.50	33	125		
Day 10	Before Lavage	7.28	72	28	Reexpansion of RUL	Improved. Large amounts of secretions removed
	After Lavage	7.37	57	40		
Day 13	Before Lavage	7.29	46	31	Reexpansion of RUL	Large amounts of secretions removed, slight duskiness for two to three minutes. No change in heart rate.
	After Lavage	7.38	35	82		

all three infants. Safety of the procedure, particularly for the more critically ill infant, seems to hinge on the amount of saline left behind in the lung. *When the time delay in initiating suctioning to remove the saline was eliminated, recovery was 60 to 80% of the portion injected.* If the total volume of saline left behind did not exceed 3-4% of the estimated lung volume, there was no apparent decrease in effective ventilation even in the presence of congestive failure.

TABLE 3
Blood Studies on Case 3

Before Lavage			After Lavage		
pH	pCO ₂ mm Hg	pO ₂ mm Hg	pH	pCO ₂ mm Hg	pO ₂ mm Hg
1) 7.3	46	70	7.33	42	105
2) 7.32	51	89	7.31	48	111
3) 7.26	51	53	7.29	52	64
4) 7.29	40	81	7.30	34	103

The technique of lavage as finally evolved appeared to yield beneficial assistance in removal of inspissated secretions as well as achieve the rapid removal of saline necessary for the procedure to be safe. More extensive use of this same technique in management of meconium aspiration syndrome is reported separately.⁶ It has also been used in infant aspiration of formula and medications.

Procedure

Recommended technique for tracheobronchial lavage in small infants:

1. The baby is intubated with a straight walled tube per the orotracheal approach. The lumen of the adapter and the endotracheal tube should be large enough to accept an 8F suction catheter. Only infants under 1,000 grams require a smaller tube and use of a 5F catheter. Maintain sterile technique.

2. 2-5 cc sterile 0.9% NaCl solution *containing no preservatives* is injected per catheter into the endotracheal tube. Immediate suctioning is applied using the same syringe that was used for injection. After the saline has been recovered from the trachea and bronchi, the catheter is removed and oxygen is given by mask over the face for five to 10 seconds.

3. The injection-suction-oxygen cycle is repeated two to three times or until the aspirated material returns clear.

4. Hydrocortisone 1-5 mg/ml may be added to the lavage solution for topical anti-inflammatory effect.

If the team is prepared, a wash-out of three to four cycles can be completed in 90 seconds. No positive pressure ventilation assistance is used if the heart rate remains above 100/minute and the baby maintains a good pink color. If the heart rate drops or the infant is dusky, assistance with a bag resuscitator or a respirator and 100% oxygen is given until the color and heart rate are back to normal.

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Meeting

Fourth National Congress on Medical Ethics will be held on April 26-28, 1973 at the Washington Hilton Hotel in Washington, D.C. Contact: Walter H. Judd, M.D., Chairman, Judicial Council, American Medical Association, 535 North Dearborn Street, Chicago, Illinois 60610.

Packed Red Blood Cells

Clinical Uses

JEFFREY McCULLOUGH, M.D.*

TRANSFUSION OF BLOOD products should be undertaken only after considering the etiology and course of the patient's disease. Often the patient does not require whole blood transfusion but only one of its components. The patient is best served when his specific blood deficits are identified and specific replacement therapy is used. In order to use any blood component wisely the physician should be aware of its composition.

Composition of Packed Red Cells

During collection whole blood is made unphysiological by the addition of the citric acid, sodium citrate and dextrose in the anticoagulant solution. If blood is studied immediately after collection, the glucose is increased, the pH is decreased (because of the citric acid) and the sodium is slightly increased (from the sodium citrate). During storage, metabolic changes continue because red cell glycolysis continues although at a subnormal rate. Glucose levels fall (Table 1), because glucose is

utilized in red cell glycolysis. Lactic acid and organic phosphates accumulate, producing further acidity. The red cell membrane is not normally maintained, allowing sodium to move intracellularly from the plasma. Potassium moves from the red cell to the plasma, and plasma potassium rises. Ammonia accumulates as a result of red cell metabolism. Thus, the plasma component becomes increasingly unphysiological and may constitute a hazard to many patients. This risk is minimized by removing the plasma before transfusion.

By converting whole blood to packed red cells, about two thirds of the plasma becomes available for the preparation of cryoprecipitate, fresh frozen plasma, albumin, fibrinogen, gamma globulin, and platelet concentrates. The volume of the unit is decreased by about 200 ml and the hematocrit is increased to approximately 70 percent (Table 2). However the red cell mass and total hemoglobin in the packed red cell unit remain unchanged from whole blood. The total protein, albumin,

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See editorial, page 301.

CHARACTERISTICS	DAYS STORED			
	0	7	14	21
Glucose mg/100 ml whole blood	330	280	240	220
Hemoglobin mg/100 ml	5-10	15	25	50
pH (whole blood)	7	6.87	6.73	6.61
Potassium meq/L	7	14	19	23
Sodium meq/L	160	159	157	153
Inorganic Phosphates mg/100 ml	3	8	12	15
Ammonia meq/100 ml	50	260	470	680

*Technical Methods and Procedures, American Association of Blood Banks, Chicago, Illinois, Fifth Edition, 1970.

TABLE 2
Comparison of the Composition of ACD Whole Blood
And Packed Red Cells after 21 Days Storage at 4°C.*

	Whole Blood	Packed Red Blood Cells
Volume (ml)	517.5	300
Red Cell Mass (ml)	200	200
Hematocrit (%)	39%	70%
Hemoglobin (gm)	60	60
Plasma (ml)	250	78
Total Protein (gm)	48.75	36
Albumin (gm)	12.5	4
Globulin (gm)	6.25	2
Citrate (ml)	67.5	22
Plasma Sodium (mEq)	45	15
Plasma Potassium (mEq)	15	4
Plasma Acid (Citric-Lactic)pH6.6 (nanoEq)	80	25
Plasma NH ₃ (μ gm)	2159	680
Protein Antigens	Maximal	Minimal
Protein Antibodies	Maximal	Minimal

*From Physician's Handbook of Blood Component Therapy. American Association of Blood Banks, Chicago, Illinois, First Edition, 1969.

and globulin are also decreased in the packed red cell unit. However this difference in protein content would not affect the recipient's serum protein concentration. Other changes when whole blood is converted to packed red cells include a decreased amount of citrate, which must be metabolized by the liver, and the removal of approximately 30 mEq of sodium. If the plasma is removed just prior to transfusion, there will be an additional loss of 10 mEq of potassium and a decrease in the total amount of acid and ammonia present. There is a decrease in the total amount of antibody and the soluble antigen present in the packed red cell unit.

Clinical Indications

One of the most important differences between whole blood and packed cells is the decreased volume. Thus packed red cells are specifically indicated for patients in whom fluid overload is a potential problem. Patients with congestive heart failure, elderly or debilitated patients who will not tolerate rapid shifts in intravascular volume, and patients with renal or hepatic failure may all benefit by the reduced volume of packed red cells.

In addition to the reduced volume, packed red cell units have decreased amounts of albumin and sodium. This is an added advantage for patients with problems of fluid overload, because of the tendency of albumin and sodium to draw water into the intravascular space.

If the plasma is removed just prior to transfusion, a unit of packed red cells has up to 10 mEq less potassium than whole blood; therefore, packed red cells are indicated for patients with hyperkalemia. The decreased total amount of acid makes packed red cells ideal for patients with acidosis. Hyperkalemia and acidosis often occur together in patients with chronic renal disease, but the value of packed red cells applies to any patient with either acidosis or hyperkalemia. The decreased amount of ammonia in the packed red cell unit is of benefit to patients with liver failure and/or hepatic coma. Since the amount of red cell antibodies in the packed cell unit is decreased, there is less danger of a severe transfusion reaction when ABO incompatibility exists between the donor's plasma and the recipient's red cells.

The general types of situations which require transfusion are: (1) stable chronically anemic patients, (2) priming of medical instruments, (3) general surgery and (4) acute massive blood loss

stable, chronically anemic patients such as those with depressed erythropoiesis, low grade decompensated hemolysis or slow blood loss require red cells, not volume replacement. The patients usually do not require sodium or potassium or citrate replacements, *only red cells*; and should be transfused with packed red cells.

Priming of heart lung instruments, dialysis instruments and other machines is becoming less of a problem; however, packed cells and saline serve this purpose equally as well as whole blood.

The use of packed red cells in routine surgical procedures has created much more debate than any of the above situations. Schorr and Marx¹ report the use of packed red cells in "routine" surgery, which included 985 procedures ranging from hysterectomy and cholecystectomy to multiple trauma and open heart surgery. During a two year period, 3850 units of packed red cells and 1858 units of whole blood were transfused. The authors concluded that "during the six years this practice has been in effect, there has been no suggestion of increased intraoperative or postoperative morbidity or mortality which could be related to the use of packed red cell transfusions."

Rush and Stewart² replaced blood loss during surgery with Hartmann's Solution until the hematocrit fell to 28-30%. They found, "no detriment to the patient's clinical state," but the blood consumed per patient admission fell 35 percent, the average amount of blood used by the surgical service decreased 320 ml per surgical procedure, and the use of single unit transfusions decreased 47 percent.

Although there are few other clinical reports concerning the use of packed red cells for routine surgery, there are many reports concerning the treatment of shock with solutions other than whole blood. Rigor, et al.³ found neither unexpected complications nor prolonged hospitalizations in 100 patients with an operative blood loss greater than 1000 ml if all of the blood loss was replaced with Hartmann's solution. Golub, et al.⁴ studied thirteen Jehovah's Witness patients who had massive surgery with blood loss approximating 40 percent of their original blood volume, and concluded that up to 1200 ml of blood loss could be replaced by crystalloid solutions alone. Moss, et al.⁵ showed that baboons which were put into shock by acute blood loss had no difference in mortality when the blood loss

was replaced by either normal saline, five percent albumin and saline, or whole blood. Thus, the loss of up to two units of blood during surgery may not require replacement with blood. We suggest that when blood replacement is necessary during surgery, the first two units be administered as packed red cells.

Acute massive blood loss is the only situation in which whole blood probably is superior to packed red cells; even this can be debated. Moss, et al.⁶ have shown that frozen red cells (which are essentially packed red cells) were equally as effective as whole blood in treating 36 acutely injured Viet Nam battle casualties. In fact, Vogel and Vogel⁷ have suggested that 80-90% of all transfusions could be given as packed red cells.

Administration of Packed Red Cells

Many physicians hesitate to order packed red cells because, due to the viscosity, they may be more difficult to administer than whole blood. This problem can be alleviated by using a large bore needle (at least 19 gauge) for administration and thoroughly mixing the packed red cell unit

every twenty minutes to prevent the red cells from accumulating at the bottom of the bag. Normal saline can be added to the packed cell unit during administration by using a Y set. The pore size and surface area of the blood filter are also important: one blood filter (Fenwal FT 293) has significantly more surface area and should facilitate the administration of packed red cells.

Conclusion

There are many situations in which packed red cells can be used, such as transfusion of stable chronically anemic patients and many cases of routine surgery. Specifically there are situations in which packed red cells *should* be used, as they are a superior product and the patient receiving whole blood is receiving a poorer form of therapy. Examples of these specific situations include congestive heart failure, chronic renal disease and hepatic coma. Furthermore, if transfusions were given as packed red cells, plasma would be available for the production of other blood components. Replacement of acute massive blood loss is the major indication for whole blood transfusion.

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are reported to cross the placental barrier and appear in breast milk. This may result in fetal or neonatal hyperbilirubinemia, thrombocytopenia, altered carbohydrate metabolism and possibly other adverse reactions that have occurred in the adult. When used during pregnancy or in women who might bear children, weigh potential benefits against possible hazards to fetus.

Precautions: Do periodic serum electrolyte and BUN determinations. Do periodic hematologic studies in cirrhotics with splenomegaly. Antihypertensive effects may be enhanced in postsympathectomy patients. The following may occur: hyperuricemia and gout, reversible nitrogen retention, decreasing alkali reserve with possible metabolic acidosis, hyperglycemia and glycosuria (diabetic insulin requirements may be altered), digitalis intoxication (in hypokalemia). Use cautiously in surgical patients. Concomitant use with antihypertensive agents may result in an additive hypotensive effect.

Adverse Reactions: Muscle cramps, weakness, dizziness, headache, dry mouth; anaphylaxis; rash, urticaria, photosensitivity, purpura, other dermatological conditions; nausea and vomiting (may indicate electrolyte imbalance), diarrhea, constipation, other gastrointestinal disturbances. Rarely, necrotizing vasculitis, paresthesias, icterus, pancreatitis, and xanthopsia have occurred with thiazides alone.

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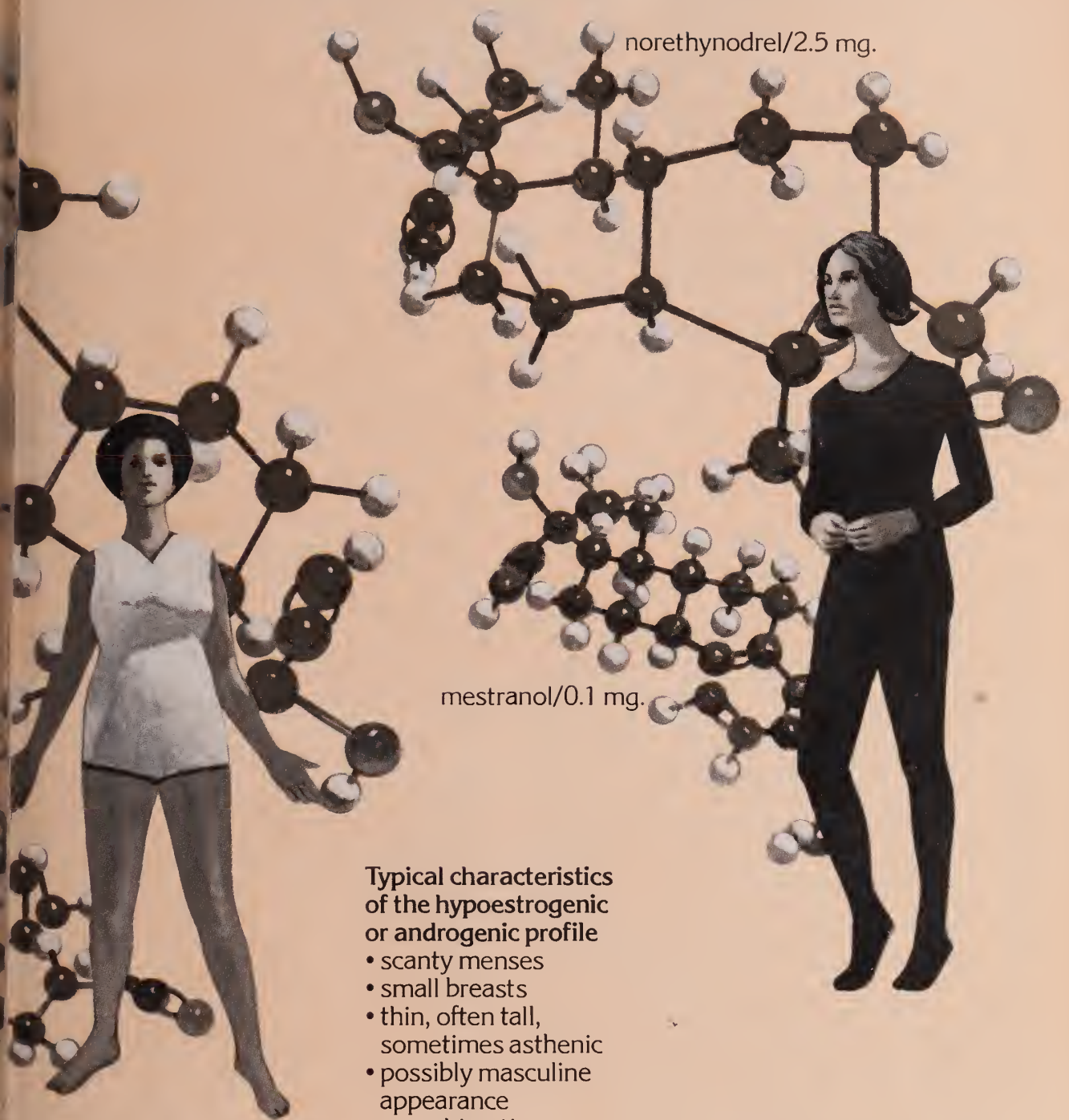
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Special note—Oral contraceptives have been marketed in the United States since 1960. Reported pregnancy rates vary from product to product. The effectiveness of the sequential products appears to be somewhat lower than that of the combination products. Both types provide almost completely effective contraception.

An increased risk of thromboembolic disease associated with the use of hormonal contraceptives has now been shown in studies conducted in both Great Britain and the United States. Other risks, such as those of elevated blood pressure, liver disease and reduced tolerance to carbohydrates, have not been quantitated with precision.

Long-term administration of both natural and synthetic estrogens in subprimate animal species in multiples of the human dose increases the frequency of some animal carcinomas. These data cannot be transposed directly to man. The possible carcinogenicity due to the estrogens can be neither affirmed nor refuted at this time. Close clinical surveillance of all women taking oral contraceptives must be continued.

Indication—Ovulen and Demulen are indicated for oral contraception.

Contraindications—Patients with thrombophlebitis, thromboembolic disorders, cerebral apoplexy or a past history of these conditions, markedly impaired liver function, known or suspected carcinoma of the breast, known or suspected estrogen-dependent neoplasia and undiagnosed abnormal genital bleeding.

Warnings—The physician should be alert to the earliest manifestations of thrombotic disorders (thrombophlebitis, cerebrovascular disorders, pulmonary embolism and retinal thrombosis). Should any of these occur or be suspected the drug should be discontinued immediately.

Retrospective studies of morbidity and mortality conducted in Great Britain and studies of morbidity in the United States have shown a statistically significant association between thrombophlebitis, pulmonary embolism, and cerebral thrombosis and embolism and the use of oral contraceptives. There have been three principal studies in Britain¹⁻³ leading to this conclusion, and one⁴ in this country. The estimate of the relative risk of thromboembolism in the study by Vessey and Doll³ was about sevenfold, while Sartwell and associates⁴ in the United States found a relative risk of 4.4, meaning that the users are several times as likely to undergo thromboembolic disease without evident cause as nonusers. The American study also indicated that the risk did not persist after discontinuation of administration and that it was not enhanced by long-continued administration. The American study was not designed to evaluate a difference between products. However, the study suggested that there might be an increased risk of thromboembolic disease in users of sequential products. This risk cannot be quantitated, and further studies to confirm this finding are desirable.

Discontinue medication pending examination if there is sudden partial or complete loss of vision, or if there is a sudden onset of proptosis, diplopia or migraine. If examination reveals papilledema or retinal vascular lesions medication should be withdrawn.

Since the safety of Ovulen and Demulen in pregnancy has not been demonstrated, it is recommended that for any patient who has missed two consecutive periods pregnancy should be ruled out before continuing the contraceptive regimen. If the patient has not adhered to the prescribed schedule the possibility of pregnancy should be considered at the time of the first missed period.

A small fraction of the hormonal agents in oral contraceptives has been identified in the milk of mothers receiving these drugs. The long-range effect to the nursing infant cannot be determined at this time.

Precautions—The pretreatment and periodic physical examinations should include special reference to the breasts and pelvic organs, including a Papanicolaou smear since estrogens have been known to produce tumors, some of them malignant, in five species of subprimate animals. Endocrine and possibly liver function tests may be affected by treatment with Ovulen or Demulen. Therefore, if such tests are abnormal in a patient taking Ovulen or Demulen, it is recommended that they be repeated after the drug has been withdrawn for two months. Under the influence of progestogen-estrogen preparations pre-existing uterine fibromyomas may increase in size. Because these agents may cause some degree of fluid retention, conditions which might be influenced by this factor, such as epilepsy, migraine, asthma, cardiac or renal dysfunction, require careful observation. In breakthrough bleeding, and in all cases of irregular bleeding per vaginam, nonfunctional causes should be borne in mind. In undiagnosed bleeding per vaginam adequate diagnostic measures are indicated. Patients with a history of psychic depression should be carefully observed and the drug discontinued if the depression recurs to a serious degree. Any possible

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influence of prolonged Ovulen or Demulen therapy on pituitary, or adrenal, hepatic or uterine function awaits further study. A decrease in glucose tolerance has been observed in a significant percentage of patients on oral contraceptives. The mechanism of this decrease is obscure. For this reason, diabetic patients should be carefully observed while receiving Ovulen or Demulen therapy. The age of the patient is not an absolute limiting factor, although treatment with Ovulen or Demulen may mask the onset of the climacteric. The pathologist should be advised of Ovulen or Demulen therapy when relevant specimens are submitted. Susceptible women may experience an increase in blood pressure following administration of contraceptive steroids.

Adverse reactions observed in patients receiving oral contraceptives—A statistically significant association has been demonstrated between use of oral contraceptives and the following adverse reactions: thrombophlebitis, pulmonary embolism and cerebral thrombosis.

Although available evidence is suggestive of an association, the relationship has been neither confirmed nor refuted for the following serious adverse reactions: neuro-ocular lesions, e.g., retinal thrombosis and optic neuritis.

The following adverse reactions are known to occur in patients receiving oral contraceptives: nausea, vomiting, gastrointestinal disturbances (such as abdominal cramps and bloating), breakthrough bleeding, spotting, change in menstrual flow, amenorrhea during and after treatment, edema, chloasma or melasma, breast changes (tenderness, enlargement and secretion), change in weight (increase or decrease), changes in cervical erosion and cervical secretions, suppression of lactation when given immediately post partum, cholestatic jaundice, headache, nervousness, dizziness, fatigue, backache, hirsutism, scalp hair, erythema multiforme, erythema nodosum, hemorrhagic eruption and itching.

Although the following adverse reactions have been reported in users of oral contraceptives, an association has been neither confirmed nor refuted: anovulation post treatment, premenstrual syndrome, changes in libido, changes in appetite, cystitis-like syndrome, nervousness, dizziness, fatigue, backache, hirsutism, scalp hair, erythema multiforme, erythema nodosum, hemorrhagic eruption and itching.

The following laboratory results may be altered by the use of oral contraceptives: hepatic function: increased sulfobromophthalein retention and other tests; coagulation tests: increase in prothrombin, fibrinogen, VII, VIII, IX and X; thyroid function: increase in PBI and butanol extractable protein bound iodine, and decrease in T₃ uptake values; methylenetetrahydrofolate determination.

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Editorials

Rochester—A Community Becomes Aware and Responds

IT IS DIFFICULT to believe that as recently as seven years ago this moderate-sized southern Minnesota city, known for its progressive nature and professional sophistication, offered next to nothing in treatment or rehabilitative resources for alcoholic or drug-dependent persons. As a psychiatrist at a mental health center in 1966, I recall wondering where to go for help with an increasing number of alcoholic patients. No different from most physicians and psychiatrists, I had received little education regarding the management of these patients, and I found community resources almost nonexistent. This was early in the mushrooming public awareness of "drug abuse" and alcoholism in their many forms and disguises. Our community was caught unaware and unprepared, as were most. It is with a sense of pride, however, that we can now describe a network of services—certainly not ideal but a rather impressive and continuing response by community leaders who rapidly became aware of the problem.

Spearheading a lonely battle for some time was the Alcoholism Information Center (AIC), originating in 1964 under private sponsorship and becoming a permanent arm of the Zumbro Valley Mental Health Center (ZVMHC) in 1966. Working closely with an active local Alcoholics Anonymous program, the AIC, as the only available community agency, attempted to provide services of diagnosis, counseling, referral, consultation, and education. As a result of this leadership as well as the growing concern of a handful of medical and mental health professionals, there developed a skeletal network for alcoholic people. This included a short-term inpatient program at Rochester State Hospital (RSH), psychiatric evaluation and group-oriented therapy through ZVMHC, a community lecture series open to the public (which continues at this time), and a detoxifica-

tion service plus medical consultation through one interested internist and the Olmsted Community Hospital.

The similarities among drug abuse, drug dependence, and alcoholism were brought into dramatic focus in 1970 by nationally known leaders who keynoted a YMCA-sponsored conference on drug abuse. Organized as a direct result of this conference was RADAR (Rochester Area Drug Abuse Response). Its board of directors, made up of students and adults in equal numbers, has gradually led a once loosely knit and vague program to the point of community credibility and permanent funding by providing an Awareness House drop-in center, a "Sunrise" hotline, and increasing educational services.

A 24-bed Alcoholism Treatment Unit, a joint project of the Mayo Clinic and Rochester Methodist Hospital, opened in March 1972. This unit provides comprehensive evaluation and treatment of alcoholic problems and also offers, under the direction of the Department of Psychiatry, training in alcoholism problems (now required for all psychiatric residents in the Mayo Graduate School of Medicine). An outgrowth of this program is a 4-hour educational block on alcoholism to be provided this spring for freshman students at Mayo Medical School.

Currently in weekly session at Mayo for the winter quarter (three months) is a seminar series on alcoholism and drug dependence sponsored jointly by the Committee on Alcoholism of the Zumbro Valley Medical Society and the Mayo Clinic Department of Psychiatry and Department of Environmental Medicine. The series involves Mayo consultants and residents as well as community experts.

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Training Course, offered through the University of Minnesota extension service but staffed with local faculty, and partially funded by local sources, has begun the task of educating a growing number of people desiring work in this field.

Added to the above are an active, conscientiously directed detoxification center (at Rochester State Hospital but under the ZVMHC umbrella), the Rochester Guest House residential program for priests, work nearing completion to

incorporate a Halfway House, and a growing municipal court program for alcohol-related crimes. Much has been accomplished in a short time—a tribute to an active and concerned community which responded after becoming aware.

Certainly we, as physicians, can and should share with other responsible citizens the leadership needed to work toward solution of the ongoing drug-dependence epidemic.

Robert M. Morse, M.D.
Mayo Clinic and Mayo Foundation
Rochester, Minnesota

Juvenile Nasopharyngeal Angiofibroma

MOST EPISTAXIS results from nasal dryness or the rupture of engorged degenerative vessels. Only occasionally does epistaxis prove to be the presenting symptom of a nasal tumor. Nevertheless angiofibroma illustrates just such a tumor. Adolescent boys rarely have epistaxis except in connection with trauma and any nosebleed in this age should be suspect. Duvall et al.* have presented an excellent review of this tumor.

Angiofibromas can often be seen on anterior nasal inspection as a dark red mass. A lateral skull Xray will show a mass in the nasopharynx. Teenage boys should have small degenerating adenoid masses and their nasopharynx should be clear on Xray. Biopsy of the tumor outside the surgical

theater is hazardous because of the likelihood of massive hemorrhage.

Surgery is the most valuable form of therapy as the tumor tends to be radioresistant. Pre-operative estrogen therapy seems to decrease vascularity and facilitate dissection.

Angiography is the most recent advance in the care of angiofibromas. The tumor will stain and its size and location can be determined. Expansion of angiofibromas can occur into the orbit, the infratemporal fossa and even the middle cranial fossa. Although histologically benign the angiofibroma can be a medical challenge in its control.

John Banovetz, M.D.
Minneapolis, Minnesota

*See page 283

Tracheobronchial Lavage

DOCTOR BURKE-STRICKLAND'S* paper on "Tracheobronchial Lavage in Small Infants" published in this issue of MINNESOTA MEDICINE deserves comment. It further demonstrates the usefulness of active and effective intervention, once thought meddlesome, in the care of the sick infant.

With the recent interest in the intensive care of the sick infant, rapid strides have been made in nursing techniques and in special procedures to aid in establishing normal pulmonary function. This technique has been proven to be beneficial to Doctor Burke-Strickland's patients. Its greatest

use would probably be in those neonates with meconium aspiration syndrome.

As with other sophisticated techniques that have developed in infant intensive care, tracheobronchial lavage should be done in an infant intensive care unit staffed by a full complement of fully trained nurses and the procedure done by a highly-skilled physician. Doctor Burke-Strickland and her unit at Hennepin General Hospital clearly fulfill those criteria.

Robert Feldt, M.D.
Department of Pediatrics
Mayo Clinic

*See page 287.

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Retroperitoneal and Mesenteric Xanthogranuloma

THE RARE AND unusual lesion of xanthogranuloma* wherever it is located, still is seeking a place of rest in classification and nomenclature. The elements present could be part of a reactive process as in inflammation and at the same time resemble histiocytic lesions and tumors of the histiocytoma group.

It is interesting to speculate that the lipid leaked from a capillary from trauma, obstruction or microscopic defect, brings about a similar type of response wherever it occurs. Similar microscopic pseudogranulomas have been seen in bone marrow sections and appear to be reactive rather than tumor. The continued expanding response to altered tissue or "extra-vascular-vascular" fluids

not removed by lymphatics, could conceivably cause such a tumor. Electron microscopic studies have shown that a vascular defect can exist in these lesions.

The confused mingling of florid reactive processes involving fibroblasts, histiocytes, and other multipotential cells has left us with a collection of lesions neither purely inflammatory nor purely malignant tumors. Xanthogranuloma at present rests in that middle ground with other lesions, such as pseudosarcomatous fasciitis or various histiocytomas.

W. A. Chadbourn, M.D.
Pathologist
Metropolitan Medical Center and
Lufkin Medical Laboratories

*See page 277.

Packed Red Blood Cells

TRANSFUSION THERAPY, whether to replace acute surgical blood loss or to raise the hemoglobin of an anemic patient not responsive to other forms of treatment, must be tailored to the patient's needs. Dr. McCullough in his paper* points out that except for hypovolemia with acute blood loss, Red Blood Cells (human)—packed cells, is the component of choice. The patient receives the benefit of the entire mass of hemoglobin for oxygen transport with only one third as much anticoagulant and donor plasma proteins as in a unit of whole blood. There are fewer adverse reactions following transfusion with packed cells and possibly less transfusion associated hepatitis. Because of these advantages of removing some of the plasma, many predict that in the future all transfusions containing red cells will be frozen blood that has been thawed and resuspended in physiologic saline.

Until recently the only disadvantage of packed

cells has been difficulty in administration. This no longer is a problem if one uses the technique suggested by McCullough.

Though not specifically related to the therapy of an individual patient needing a transfusion, the use of packed cells rather than whole blood is important in the overall management of the blood resource. The blood bank must depend on the small segment of the population (less than three percent of those eligible) willing to give their blood. From this we must meet the demands for fresh frozen plasma, antihemophilic globulin, platelets, plasma to be converted to plasma protein fraction and gamma globulin etc. Thus everytime a patient unnecessarily gets whole blood he is at greater risk and the blood resource is depleted of components that could save another patient's life.

Herbert F. Polesky, M.D.
Minneapolis, Minnesota

*See page 290.

OLD DOC HESS SAYS: *If in writing you really want to make it personal, "I, me, my, myself, personally—" just about makes it certain whom we are talking about. . . . C.O.R.*

Congenital Abnormalities of the Coronary Arteries

THE INTERESTING case report of Kiser and Schultz* raises several questions. The title is "Congenital Coronary Arterial Venous Fistula" whereas the case report describes what appeared to be anomalous origin of the right coronary artery from the pulmonary artery. The discussion and references do not recognize anomalous origin of coronary arteries as a different abnormality with different pathophysiological and therapeutic implications.

Primary anomalies of coronary arteries may be divided into two major groups depending upon whether the entire coronary system arises from the aorta or at least part of the coronary circulation arises anomalously from the pulmonary artery.¹ Coronary artery fistula usually refers to a congenital abnormality in which the coronary arteries originate normally from the aorta but an abnormal fistula drains preferentially to the right ventricle, an atrium, the coronary sinus, the pulmonary artery or a bronchial vessel instead of to the coronary vein via a normal coronary and myocardial distribution. Anomalous origin of a coronary artery indicates a normal distal coronary distribution but one of the coronary arteries originates from the pulmonary artery instead of from the aorta. In this circumstance a sizable left to right shunt to the pulmonary artery may develop via enlarged but normally distributed coronary collaterals from one coronary system to the other.² With the exception of the peculiar thin walled structure with questionable connections to the aorta and pulmonary artery, the case described by Kiser and Schultz would seem to best fit the latter diagnosis.

The pathophysiology of different primary anomalies of the coronary arteries varies greatly. With coronary arterio-venous fistulae the dominant physiologic abnormality is the shunt which may cause an increased pulse pressure, heart failure and a continuous precordial murmur. Complications include bacterial endocarditis and aneurisms which may rupture causing acute hemoperi-

cardium. Myocardial ischemia can occur but is rare. Anomalous origin of the left coronary artery from the pulmonary artery is very serious because as the pulmonary artery pressure drops to normal after birth, coronary flow to the left ventricle may be severely compromised and ischemic symptoms develop, often first noted as a feeding problem in infancy. Anomalous origin of the right coronary artery from the pulmonary artery on the other hand is usually a benign condition without serious clinical consequences.³ The condition may become manifest as an adult because of a continuous murmur confused with a patent ductus arteriosus but evidence of myocardial ischemia is rare. When large collaterals permit a large left to right shunt or a continuous murmur to develop, the diagnosis of anomalous origin of a coronary artery is usually obvious by aortography if the contrast injection is made into the aortic root. The distal coronary distribution is normal but the coronary arteries are very large and the coronary artery that arises anomalously from the pulmonary artery fills late with retrograde flow.

Anomalous origin of the left coronary artery from the pulmonary artery may require reconstructive surgery but simple ligation of an anomalous right coronary artery at its origin from the pulmonary artery may be all that is necessary to correct both the shunt and any ischemic symptoms. We have studied a patient with anomalous origin of a right coronary artery in which an attempt was made to transplant the right coronary artery from the pulmonary artery to the aorta. Postoperative angiograms demonstrated that the transplanted artery had closed proximally, presumably from thrombosis caused by the high distal coronary back pressure related to large collaterals. The use of reversed saphenous vein by-pass is also a logical anatomical method of surgical correction but might be expected to result in thrombosis for the same physiological reasons. A follow-up selective angiogram of the vein graft in the case described by Kiser and Schultz, therefore, would be both inter-

*Kiser Joseph C and Schultz Robert: Congenital coronary arterial venous fistula, repair. *Minnesota Med* 55:988, 1972.

esting and instructive, especially since many of

the collateral channels were apparently ligated.

Charles R. Peterson, M.D.
James C. Dahl, M.D.
St. Louis Park, Minnesota

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Circulating Blood Flukes

SCHISTOSOMIASIS is a chronic and debilitating disease, as demonstrated in the remarkable series of cases by Haedicke in the December issue of MINNESOTA MEDICINE.* Transmitted to humans through contaminated water the fluke has a highly consistent and complex life cycle that is a biological wonder.

According to the World Health Organization¹ schistosomiasis is endemic in many areas of the world. It is estimated that there exist 200,000,000 infected persons in the less technically advanced countries. Travelers can become infected through drinking water from a questionable source or by swimming in such waters with entrance of the parasite through the skin. The disease can usually only be proved through the demonstration of the ova in either the feces or urine or by mucosal biopsy of the rectum.

One of the most spectacular and little known stories of schistosomiasis relates to the planned invasion of Taiwan (Formosa) by the Chinese Nationalists in 1950, as recorded by Frank Kierman, Jr.[†] The defenses of Taiwan were vulnerable to a waterborne attack from the Chinese Mainland. Transportation of trained Nationalist troops would be made in wooden junks, and then for a short distance at the termination of the journey the men would swim ashore. In preparation for this invasion the troops were given intensive swimming lessons in canals of southern Chekiang and northern Fukien. Unfortunately the waters were inhabited by *Schistosoma japonicum*, and 30,000 to 40,000 men became infected and disabled. Medical care was inadequate; time for the invasion was at hand, and the military project failed because of this blood fluke.

Wesley W. Spink, M.D.
Minneapolis, Minnesota

*Page 1105.

†Harper's Magazine, April, 1959.

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Cover Painting

"Water Lilies"

Dr. Herbert W. Johnson began painting in 1967, and the cover is the result of early summer viewing of the swamp areas in the neighborhood of Mendota Heights. These areas no longer exist today.

This particular painting won first prize in the Dakota County Art Fair, a few years back.

Dr. Johnson is an Associate Professor in Internal Medicine at the University of Minnesota and in addition, practices in St. Paul. He spends most of his spare time painting and sailboating.

Letter to the Editor

As a result of the efforts of many pioneer vascular surgeons in the past, prosthetic cardiac valve replacement can now be done with a relatively low mortality rate. Their efforts should humble even the most outspoken present day surgeon. Even with these advancements it does not require much time or realism to discover the true palliative nature of cardiac valve replacement.

Nothing is more discouraging than to see a patient successfully undergo a serious procedure, to recover and enjoy life less plagued by symptoms, only to suffer from the complications of thromboembolism or prosthetic valve endocarditis. Fortunately the majority of these complications are reversible; however, in spite of improvements in valve design, they continue to take their untimely toll. Recent reminders have emphasized the need to alert physicians and dentists about therapeutic levels of anticoagulation. It behooves everyone involved with these patients to be aware of other pharmaceutical products which will interfere with prothrombin levels. Until the ideal prosthetic replacement is available, maximum sustained therapeutic improvement can only be maintained by a continued careful medical and dental awareness.

The problems of prosthetic valve infection can be minimized through the use of prophylactic antibiotics during dental care. The dental profession must be alert to the disastrous consequences of this complication.

With diligence on our part and an awareness by the oral surgeon we can help sustain that palliative improvement which valve replacement can provide.

Hovald K. Helseth, M.D.
Thoracic Surgery
Hennepin County General Hospital

University of Minnesota

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Additional courses may be announced during the year.

For further information concerning the above listed programs and opportunities contact: Director, Postgraduate Medical Education, Box 193 Health Sciences Center, University of Minnesota, Minneapolis .Minnesota 55455.

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Observation and photos by Kathleen Brough, M.D., Marion County Home, Indianapolis, Ind.

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TRAVASE enzymes are selective. Virtually inactive on viable tissue.

When this recommended nursing technique is followed without deviation, this procedure can generate visible improvement within 48 hours . . .



(Ulcer being irrigated)
Thoroughly cleanse and irrigate the wound area using only sterile water or sodium chloride solution. Be sure to cleanse the wound of any antiseptics or heavy-metal antibacterial agents which may interfere with the enzyme activity.

Thoroughly soak the wound area. Where practical, tubbing or showering is suitable. Or wet soaks with gauze pads may be used. Remember to avoid chemical cleansing agents which may interfere with the therapy.

With a sterile cotton swab or finger cot, apply a very thin layer of TRAVASE Ointment. The ointment spreads easily and only a small amount is needed (a small dab of ointment will cover an area as big as the back of a hand).

Be sure, though, to rub the ointment well into every crack or crevice of the wound and overlap the surrounding skin one-fourth to one-half inch beyond the area to be debrided—to be sure of complete coverage.



Apply loose, wet dressings, thoroughly soaked in sodium chloride solution or sterile water to the area to be debrided only.

Cover the moist dressings with an occlusive wrap (Saran wrap, Telfa Pads, or other plastic wrappings) to keep wound site moist. Do not extend occlusive wrap over 1/2 inch beyond area to be debrided.

When changing dressing, gently wipe away the dissolved material. Repeat the complete dressing procedure, including application of TRAVASE Ointment, four times daily.

The ulcer shown in these photos is simulated on a model in order to demonstrate the correct TRAVASE application technique.

DESCRIPTION: TRAVASE® (brand of sutilains) Ointment is a sterile preparation of proteolytic enzymes, elaborated by *Bacillus subtilis* hydrophobic ointment base consisting of 95% white petrolatum and polyethylene. One gram of ointment contains approximately 82,000 units* of proteolytic activity.

ACTION: TRAVASE Ointment selectively digests necrotic soft tissue proteolytic action. It dissolves and facilitates the removal of necrotic tissues and purulent exudates that otherwise impair formation of granulation tissue and delay wound healing (4).

At body temperatures these proteolytic enzymes have optimal activity at the pH range from 6.0 to 6.8.

INDICATIONS: For wound debridement (1,2)—TRAVASE Ointment is indicated as an adjunct to established methods of wound care in biochemical debridement of the following lesions:

- Second and third degree burns,
- Decubitus ulcers,
- Incisional, traumatic, and pyogenic wounds,
- Ulcers secondary to peripheral vascular disease.

CONTRAINDICATIONS: Application of TRAVASE (brand of sutilains) Ointment is contraindicated in the following conditions:

- Wounds communicating with major body cavities,
- Wounds containing exposed major nerves or nervous tissue,
- Fungating neoplastic ulcers,
- Wounds in women of child-bearing potential—because of lack of laboratory evidence of effects of TRAVASE upon the developing fetus.

Do not permit TRAVASE Ointment to come into contact with the eyes. In treatment of burns or lesions about the head or neck, the ointment inadvertently come into contact with the eyes, the eyes should be immediately rinsed with copious amounts of water, preferably sterile.

PRECAUTIONS: A moist environment is essential to optimal enzyme activity. Enzyme activity may also be impaired by certain agents: several detergents and antiseptics (benzalkonium chloride, hexachlorophene, iodine, and nitrofurazone) may render the substrate indifferently to the action of the enzyme (3). Compounds such as containing metallic ions interfere directly with enzyme activity to a slight degree, whereas neomycin, sulfamylon-streptomycin, and do not affect enzyme activity. In cases where adjunctive topical has been used and no dissolution of slough occurs after treatment with TRAVASE Ointment for 24 to 48 hours, further application, because of interference by the adjunctive agents, is unlikely to be rewarding.

In cases where there is existent or threatening invasive infection, appropriate systemic antibiotic therapy should be instituted concurrently.

Although there have been no reports of systemic allergic reactions in humans, studies have shown that there may be an antibody response to humans to absorbed enzyme material.

ADVERSE REACTIONS: Adverse reactions consist of mild, transient paresthesias, bleeding and transient dermatitis. Pain usually can be controlled by administration of mild analgesics. Side effects severe enough to warrant discontinuation of therapy occasionally have been reported.

If bleeding or dermatitis occurs as a result of the application of (brand of sutilains) Ointment, therapy should be discontinued. No toxicity has been observed as a result of the topical application of TRAVASE Ointment.

Dosage and Administration

STRICT ADHERENCE TO THE FOLLOWING IS REQUIRED FOR RESULTS OF TREATMENT

1. Thoroughly Cleanse and Irrigate Wound Area with sodium chloride solution. Wound **MUST** be cleansed of antiseptics, heavy-metal antibacterials which may denature enzyme substrate characteristics (e.g., Hexachlorophene, Silver, Benzalkonium Chloride, Nitrofurazone, etc.).
2. Thoroughly moisten wound area either through tubbing or wet soaks (e.g., sodium chloride or water solutions).
3. Apply TRAVASE Ointment in a thin layer assuring intimate contact with necrotic tissue and complete wound coverage extending 1/4 to 1/2 inch beyond the area to be debrided.
4. Apply loose wet dressings.
5. Repeat entire procedure 3 to 4 times per day for best results.

How Supplied

3P3002 TRAVASE Ointment is supplied sterile in one-half ounce (14.2 g.) containing 82,000 casein units of sutilains per gram in a hydrophobic ointment base.

The ointment must be stored under refrigeration at 2° to 10° C (35° to 50° F).

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*A casein unit is the amount of enzyme required to produce an optical density at 275 mμ of a solution of 1.5 mcg. tyrosine after the enzyme has been incubated with 35 mg. of casein at 37° C for one minute.

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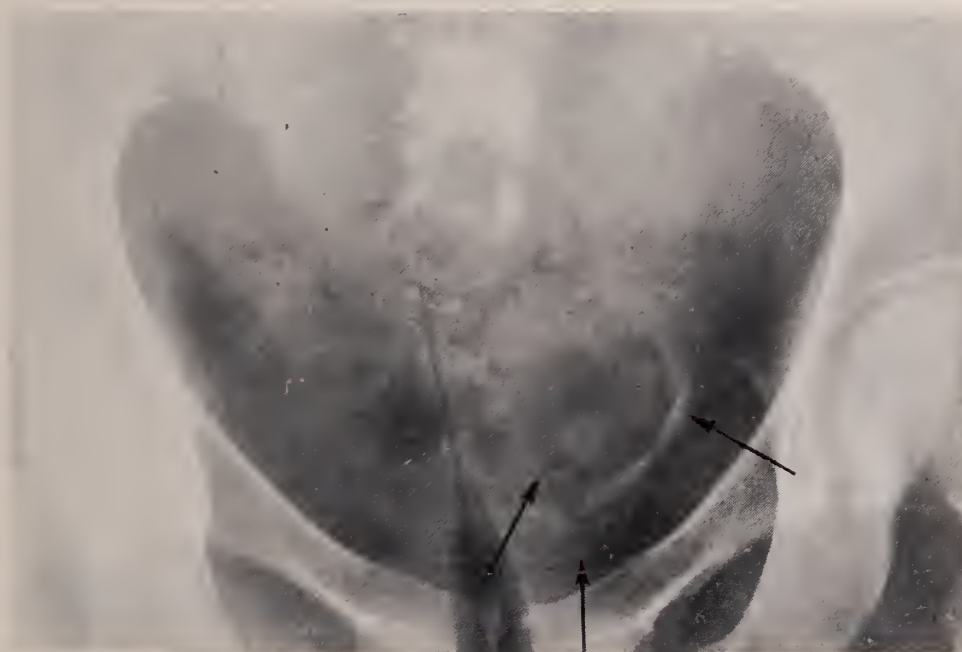
X-ray Conference

Calcifications in the Bladder Wall

A 35-YEAR-OLD WOMAN was hospitalized with a history of chills, fever and back pain for three to four days. The physical examination was essentially negative. The white count was 8,700/cmm with 74% neutrophils. Urinalysis showed 2+ albumin and numerous white blood cells.

The KUB film shows linear calcifications in the region of the bladder (Figure, arrows).

At this point the radiologist inquired about the nationality of the patient.



Figure

Diagnosis: Urinary schistosomiasis (bilharziasis).

The patient was a recent immigrant from Egypt. The disease, caused by *Schistosoma haematobium*, is endemic in Egypt and throughout Africa. It is also found in other areas of the Middle and Near East, the Malagasy Republic, Portugal and a small area near Bombay, India. The adult flukes live in the vesical and pelvic venous plexuses. Ova are deposited in the submucosal venules of the urinary bladder and subsequently escape into the perivascular tissue causing progressive cystitis with ascending secondary infection of ureters and kidneys. Polyps, carcinoma and contraction of the bladder, ureteral stricture, urinary stones, hydronephrosis, urethral stricture and involvement of the prostate and seminal vesicles are common sequelae. Calcification may be demonstrated in these areas roentgenographically. In the bladder it is linear (Figure) or "cloudlike" in appearance.

The current symptoms of this patient were attributed to acute pyelonephritis due to *E. coli* and responded promptly to antibiotic therapy. Excretory urography disclosed normal kidneys and ureters and confirmed the intramural location of the bladder calcification. Although *S. haematobium* ova were not found in the urine, the radiographic finding of such calcification in a person from Egypt was virtually pathognomonic of bilharziasis.

S. H. Tsai, M.D.
Department of Radiology
Hennepin County General Hospital
Minneapolis, Minnesota

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Moore's Syndrome

A small number of children and young adults who were subject to irregular recurrent paroxysms of unexplained abdominal pain were found to have abnormal electroencephalograms. Klingman and associates studied 12 such cases; Moore, whose eponym is used, described the syndrome, which he termed a form of symptomatic epilepsy, and reported an additional case.

The attacks usually occurred over a period of years, beginning with sudden cramplike pain involving the entire abdomen, accompanied by nausea and vomiting. The severity often caused prostration. Convulsive manifestations were evident during some period in nine of the patients studied by Klingman. Electroencephalographic findings were suggestive of cerebral dysrhythmia, mostly of the psychomotor equivalent pattern. In Moore's patient, abnormally slow waves were observed, particularly over both frontal lobes. Considerable experimental and clinical evidence has indicated injury to the cerebral cortex, especially of the frontal lobes. This localization may involve the premotor area as well as Brodmann's areas three and five, and perhaps six (Moore). Anticonvulsant therapy brought about a cessation of attacks and restored the alpha activity to the EEG tracings.

Durham, Robert H.—Encyclopedia of Medical Syndromes
Hoebner Medical Division, Harper and Row, New York

Clinical Path Conference

Pelvic Mass in a 65-Year-Old Female

CURTIS J. LUND, M.D.*, DAVID W. GAUGER, M.D.† AND JOHN A. REICHERT, M.D.‡

A 65-YEAR-OLD WHITE female, para 3-0-1-3, whose last menstrual period was at age 38, was seen in the Gynecology Clinic at Hennepin County General Hospital because of lower abdominal pain for three weeks, loss of appetite, and constipation. Abdominal and pelvic examination revealed a cystic mass filling the pelvis and extending to the umbilicus. A diagnosis of ovarian tumor was made.

Two weeks later she was admitted to the hospital and had new complaints of abdominal distention, nausea and vomiting, and weight loss. She also complained of intermittent watery, brownish vaginal discharge for two weeks. The patient stated that since regular menses had stopped, she had vaginal bleeding of three to five days duration, occurring about every three months. Past and family history were otherwise non-contributory.

Physical examination on admission revealed an obese, lethargic, white woman in acute distress. The pulse rate was 90 and the blood pressure 160/75. Her skin showed loss of turgor with "tenting." No lymph nodes were palpated. Mucous membranes of the mouth and throat were dry. The chest was clear. The liver and spleen were not palpable. A mass, extending to just above the umbilicus was felt and ascites was also detected.

Pelvic examination showed atrophic vulvar and vaginal tissue with no vaginal lesions. The cervix was small and grossly free of tumor. The mass was movable and very tender. There was 2+ pitting edema of both ankles.

Initial laboratory studies revealed a hemoglobin of 11.7 gms., hematocrit 35.9, 81% neutrophils, and a white count of 11,600. Urinalysis revealed a specific gravity of 1.016, pH 5.2, and 1+ albumin. The arterial pH was 7.45, pCO₂ 24 mm, and

pO₂ 98 mm. The sodium was 130 mEq, potassium 3.7 mEq, chloride 107 mEq, and CO₂ was 11 mEq. The blood sugar was 222 mg and serum acetone was negative. The serum creatinine was 3.4 mg and the BUN 55 mg. The BSP was 13% at 45 minutes. Urine cultures were sterile. Chest Xray on admission was normal.

The patient was treated on admission with 5% dextrose in 1/2-normal saline and 20 mEq. of KCl/1000 ccs. of fluid. The patient received 2400 cc. of fluid over the first 24 hours of her admission and had only 600 cc. of urine output. Her urine output subsequently dropped to 10 cc. per hour. Sodium bicarbonate and lasix were added to her therapy, without response.

On the second hospital day, the sodium was 127 mEq, potassium 4.6 mEq, chloride 96 mEq, CO₂ 12 mEq, hemoglobin 11.4 gms and hematocrit 33.9%. The arterial pH was 7.41, pCO₂ 17 mm, pO₂ 88 mm. The urine specific gravity was 1.010 and the urine output gradually decreased to zero. The central venous pressure (CVP) was measured at zero. Intravenous mannitol and sodium-free plasma infusions were initiated. The following morning the patient had generalized pulmonary rales and audible gurgling with respirations. She received 80 mg. of lasix and 0.5 mg. of digoxin intravenously. The urine output increased to 20 cc. per hour and her CVP at this time measured 15. She began to bleed from venipuncture sites. A prothrombin time was 14.3 seconds with a control of 12 seconds and the PTT was 40.9 seconds with a control of 34.1 seconds. The fibrinogen was 0.21 gm., thrombin time 12.5, and fibrin split products had a titer of 1:64. Her hemoglobin was now 8 gms, hematocrit 25.2 and normal red cell indices. The platelet count was 142,000.

Abdominal distention increased and a paracentesis was done on the fourth hospital day; 75 cc. of bloody fluid was removed. The hematocrit on this fluid was 14 and a Gram stain revealed red and white blood cells but no bacteria. The

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patient continued to be oliguric despite repeated courses of lasix and mannitol. She developed a fever of 101°F and 100,000 colonies cc of *E. coli* were cultured from her urine. An exploratory laparotomy on the fifth hospital day revealed a pelvic mass measuring 24 x 16 x 16 cm. The mass was not removed. The space of Retzius and flanks were drained and the wound was closed. A ureteral catheter was inserted on the left side but the right ureteral orifice was not found. The patient awoke after surgery and remained anuric. The patient became hypotensive 16 hours after surgery and died on the morning of the sixth hospital day.

Clinical Discussion

Curtis Lund, M.D.:

The patient is a 65-year-old multiparous female who had a premature menopause at the age of 38 which was about 27 years before this hospitalization. The patient had somewhat regular uterine bleeding every two to three months until shortly before her admission when she began having watery brown vaginal discharge. The history of intermittent vaginal bleeding for several years is difficult to explain on an endocrinological basis but is significant in this patient's history.

The second significant feature in this patient's history is the lower abdominal pain which had been present for approximately three weeks. She had also noted anorexia, abdominal pain, constipation, abdominal distention, nausea, vomiting, and weight loss over a period of a few weeks although the patient was confused, so perhaps her history is not reliable. Despite her appearance of dehydration, the patient was described as having lower extremity edema and ascites. These findings, in combination with the finding of a large pelvic mass, would suggest that the pelvic mass had begun to encroach upon the venous and lymphatic return of the lower extremities.

On abdominal and pelvic examination the mass within the pelvis and abdomen was firm and extending above the umbilicus. Also, the mass was described as being very tender. Abrupt changes within a malignant mass such as hemorrhage into infarcted, necrotic areas or infection can cause pain and tenderness. Interestingly, the mucous membrane of the vagina and the cervix was described as being atrophic. We have a patient who has vaginal bleeding for approximately 25 years and now is described as having an

atrophic mucosa. An actively functioning granulosa thecal cell tumor would not be likely in the presence of atrophic vaginal and cervical mucosa. There is no information regarding whether the uterus had been sounded at the time of the initial pelvic examination. It would be advisable to sound the uterus under these circumstances and to examine the tissue which might be removed from the uterus at the time. The sounding of the uterus would also be helpful in determining the size of the uterus.

When there is ascites present in the absence of hepatic, renal or cardiac disease, a pelvic neoplasm of ovarian origin and occasionally of gastrointestinal origin must be considered. Tuberculosis must also be considered. Rarely one finds ascites with an ovarian fibroma, the so-called Meig's syndrome. Occasionally large uterine myomata in the absence of other abnormalities cause ascites.

The hematocrit of 35 in the presence of dehydration represents hemoconcentration. The serum potassium and sodium are low and in the presence of a pH of 7.45, which is tending towards alkalosis, would suggest vomiting of electrolytes and hydrochloric acid. However, a chloride of 107 is not consistent with this hypothesis.

After admission the patient was hydrated in an attempt to correct the electrolyte abnormalities. During the first day of the patient's admission she had approximately 2400 cc. of fluids and had only a 600 cc. urine output. The urinary output continued to diminish despite the use of diuretics. The specific gravity of 1.016 in the presence of dehydration suggests an inability of the kidneys to concentrate the urine. The following day there was essentially no urine output. At the same time the CVP was recorded as zero. I am not able to explain the zero reading. At this time the patient received mannitol and plasma in an attempt to increase urinary output. During the therapy she developed acute pulmonary edema. The therapy did increase urinary output somewhat and also increased the CVP. With the hydration therapy there was found to be a drop in the hematocrit.

At this time there was also noted to be some bleeding from the venipuncture sites. Now I cannot qualify as a hematologist, but I think the important laboratory results at this time are the essentially normal prothrombin time, the distinctly elevated PTT, the satisfactory fibrinogen level and the fibrin split product titre of 1:64. The fibrin split products could be explained by

the presence of a tumor. Certainly, we know that in some malignancies there is a state of hypercoagulability and with fibrin lysis, one would expect some degree of fibrin split products. I do not believe that these values indicate disseminated intravascular coagulation.

The patient developed increased abdominal distention and a paracentesis revealed a fluid of the same color as venous blood. Its hematocrit was 14 when the patient's hematocrit was 25, indicating a significant amount of blood in the paracentesis sample. In the presence of a large pelvic tumor mass and ascites, the paracentesis needle can be inserted into the tumor and fluid can be withdrawn from the tumor itself. I think there is a distinct possibility that the trochar went into a loculated cavity of the neoplasm. Blood can be present in ascitic fluid, but in the presence of significant ascites, a hematocrit of 14 represents a considerable amount of blood within the peritoneal cavity. It is assumed that the trochar was most likely within a loculated cyst of the neoplasm. This fluid had both red and white blood cells so it represented a relatively recent hemorrhage that may have partly caused the decreased hematocrit.

The patient remained essentially anuric. Is this pre-renal or renal failure; or a post-renal obstruction with renal failure? The clinical course doesn't answer this and the reason will have to remain obscure. I suspect a considerable degree of post renal obstruction due to a pelvic tumor encroaching upon the base of the bladder or the ureters.

A laparotomy was done. I don't know what the pre-operative diagnosis was but this large tumor, reaching above the umbilicus, could hardly come from anything other than the ovaries or uterus. A tubal disease of this magnitude is almost unheard of. As far as the uterus is concerned, I think we have to keep in mind this long history of uterine bleeding. This bleeding history would be consistent with a myomatous uterus, if some of the myomas were in the submucous position and periodically bled into the endometrial cavity. Something could have happened to change these, such as the development of a sarcoma within the uterus. This sequence of events could explain all the gynecological features.

A tumor of this size could be of ovarian origin. Huge ovarian tumors are usually cystic and often are mucinous cystadenomas or mucinous cystadenocarcinomas. A mucinous cystadenocarcino-

ma is, therefore, a likely preoperative diagnosis. This could have been one of the so-called solid ovarian malignancies which can grow to a considerable size. Frequently, however, these neoplasms spread to the omentum, forming an omental cake, and when you examine the patient, you feel a mass up to the umbilicus and above. An ovarian neoplasm would not explain the uterine bleeding, except in the case where an ovarian metastasizes to the endometrial cavity and then causes uterine bleeding. This would not explain, however, the many years of intermittent bleeding this patient had.

There are a number of extra-genital tumors that have to be considered. One consideration is a solitary pelvic kidney but the pelvic kidney is not a tumor of this size. For this to represent a pelvic kidney, something pretty disastrous would have had to happen. Possibly a hydronephrosis or something of that nature could have caused such a large mass.

There are primary peritoneal tumors which I will not discuss at this time. Also to be considered are retroperitoneal tumors. The largest one of these that I have seen was a liposarcoma. Other neoplasms, particularly the neural tumors, can occur in the retroperitoneal space. However, none of these would explain the findings in this case, except for the pelvic mass.

A laparotomy was done and after exploration the incision was closed and drained without the removal of the mass. Following surgery, the patient became anuric and died. Why was the mass left in-site and only biopsied? Either this structure, whatever it was, shouldn't be removed and therefore was not, or the structure couldn't be removed. Now, what shouldn't be removed? It could have been a solitary kidney, and therefore, could not be removed. If one was dealing with an uterine malignancy that could not be removed in toto, then an attempt might be deferred and the patient treated with radiation therapy. If it was an ovarian tumor, certainly one would attempt to remove as much as he could. If this was an ovarian cyst, one should be able to remove the major part of the tumor. Of the tumors that could not be removed, one would be an extensive adenocarcinoma of the ovary which involved the lateral pelvic walls and the ureters. Similarly, an extensive uterine sarcoma which had spread to the pelvic walls is very difficult, if not impossible,

to remove because of the extensive bleeding that may be encountered. Patients have died from surgical attempts to remove a pelvic sarcoma.

My first diagnosis is uterine sarcoma. The second is metastatic ovarian carcinoma; and the third primary ovarian carcinoma. I can't dismiss the possibility of a pelvic kidney. The placement of drains in the space of Retzius is very suspicious for a renal problem.

Clinical diagnosis: uterine sarcoma.

David W. Gauger, M.D.:

Dr. Lund's conclusion is correct. The tumor is a uterine sarcoma. The immediate cause of the patient's death was an acute pulmonary embolus

to the right lower lung (Figure 1). The lungs had a combined weight of 1040 grams.

There was a pelvic mass that measured 24 x 2 x 18 cm. 3700 gms. The mass arose cephalad to the cervix in the region of the uterus. There were areas of firm neoplastic light yellow to brown tissue that was alternating with cystic areas of necrosis and hemorrhage (Figure 2). The tumor compressed the gastro-intestinal organs. The neoplasm was composed of round and fusiform cells and there were scattered cells that had cross striations characteristic of skeletal muscle (Figure 3). This malignancy was interpreted as being poorly differentiated, mixed mesodermal sarcoma.



Fig. 1—Pulmonary embolus involving right inferior lung.

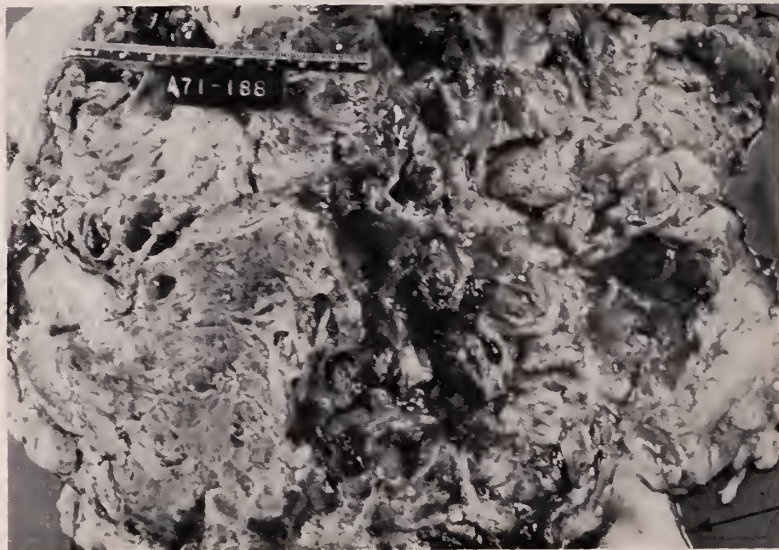


Fig. 2—Mixed mesodermal sarcoma of uterus—arrow pointing to cervix.

The neoplasm had extended widely involving the serosa of the sigmoid colon as well as the serosa of the bladder. In addition, the malignancy had spread to involve the distal portion of the right ureter, compressing it and causing a right hydronephrosis. The neoplasm, however, had not involved the mucosa or the lumen of the right ureter. The left ureter was normal. There was no omental cake and there were no metastases to distant organs.

The kidneys were approximately symmetrical and had a combined weight of 420 grams. On gross examination, they were slightly softer than normal and had a more yellow appearance. The cortex was 4-6 mm thick and there was a distinct corticomedullary junction. On microscopic examination, the kidneys were interpreted as representing an arteriolar nephrosclerosis, characterized by sclerosis of the renal arteries with narrowing of their lumina as well as hyalinization and sclerosis of scattered glomeruli. There were areas of fibrosis and chronic inflammatory cell infiltration within the cortex. Some glomeruli had occasional neutrophils present. This was interpreted as being due to an early ascending renal infection.

Pathological diagnosis:

1. Acute pulmonary embolus, right lower lung.
2. Poorly differentiated mixed mesodermal sarcoma, uterus. (A) Extensive local infiltration.
 - (1) Infiltration of the serosa of the sigmoid colon and bladder.
 - (2) Extension to the distal right ureter with right hydronephrosis.
3. Arteriolar nephrosclerosis of both kidneys.

John A. Reichert, M.D.:

The diagnosis and management of mixed mesodermal tumors of the uterus has represented a gynecological enigma for many years, since they are rare but highly malignant.

Uterine sarcomas comprise less than 1% of all uterine neoplasms and only 15 to 20% of all uterine sarcomas are mixed mesodermal sarcomas. The tumor occurs in all races and the patients range from nulliparity to multiparity. The mean age is about 60 years and most are post-menopausal. From 10 to 25% of patients with uterine sarcomas have a history of radiation, usually for benign uterine lesions. The tumor usually arises from the mucosa of the posterior wall with rapid growth into the uterine cavity. There can be either solitary or multiple growths. The lesion often grossly resembles a benign polyp.

These tumors can not only produce the rhabdomyocyte, as seen in the present case, but also can contain a cartilaginous or osteogenic tumor, liposarcoma, or occasionally an embryonal form. Very often they have a concomitant epithelial component which often has the characteristics of an adenocarcinoma of the endometrium.

Generally the tumor is confined to the uterus when first diagnosed. Although there is predilection for local extension by this neoplasm, lymphatic and hematogenous metastases are not rare. When they occur distant metastases are to the lung, but liver and brain are not exempt. Histogenetically, the mixed mesodermal tumors are thought to arise from multi-potential stromal cells which have the ability to differentiate into either epithe-

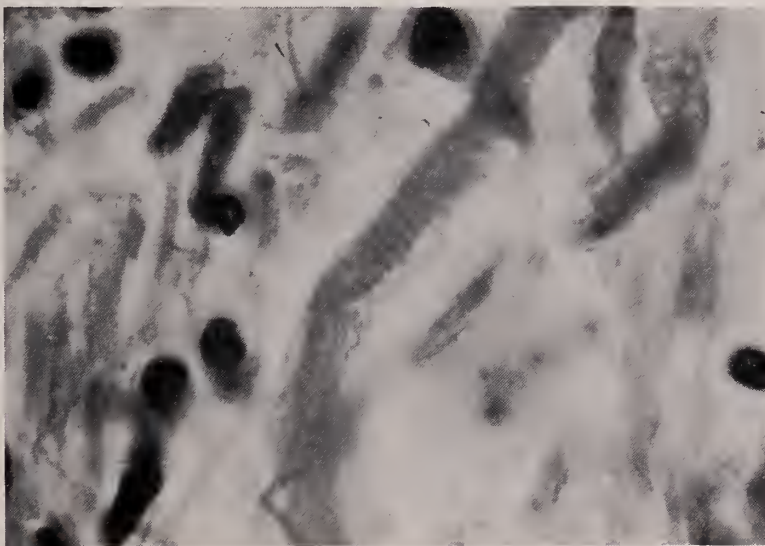


Fig. 3—Microscopic appearance of characteristic crossed striations in a mixed mesodermal sarcoma (1000 x).

lium or mesoderm. The mesodermal cells differentiate into various types of tissues, such as striated muscle osteoid or cartilagenous tissue, producing the heterogenous tissues so often seen in mixed mesodermal sarcomas.

Bleeding and discharge are the symptoms that cause these post-menopausal women to seek medical help. The average duration of these symptoms is two months. Abdominal or pelvic pain may be present and when the tumor is advanced, intestinal symptoms and weight loss may be present. About 75% of the patients have enlargement of the uterus when first seen. Nearly 25% have viable tumor extruding from the cervical os at the time of initial examination. Punch biopsy and dilatation and curettage establish the diagnosis in ap-

proximately 50% of the cases. These tumors usually recur within the first year. The five year survival rate is 15 to 20%.

Radiotherapy offers little in the control of these neoplasms. Adequate operation is the treatment of choice. Surgery should include a total abdominal hysterectomy and bilateral salpingo-oophorectomy. Chemotherapy has been of little help.

Dr. Asinger:

Was the bleeding for 25 years secondary to the neoplasm?

Dr. Reichert:

The bleeding for the 25 years was not due to the neoplasm. The malignancy was probably present for less than a year.

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"I was once, I remember, called to a patient who had received a violent contusion in his tibia, by which the exterior cutis was lacerated, so that there was a profuse sanguinary discharge; and the interior membranes were so divelicated, that the os or bone very plainly appeared through the aperture of the vulnus or wound. Some febrile symptoms intervening at the same time (for the pulse was exuberant and indicated much phlebotomy). I apprehended an immediate mortification. To prevent which, I presently made a large orifice in the vein of the left arm, whence I drew twenty ounces of blood; which I expected to have found extremely sily and glutinous, or indeed coagulated, as it is in pleuritic complaints; but, to my surprise, it appeared rosy and florid, and its consistency differed little from the blood of those in perfect health. I then applied a fomentation to the part, which highly answered the intention; and after three or four times dressing, the wound began to discharge a thick pus or matter, by which means the cohesion—But perhaps I do not make myself perfectly well understood?"*

*Henry Fielding: Tom Jones, Book VII Chapter XIII 1749.

"The history of science, and in particular the history of medicine... is... the history of man's reactions to the truth, the history of the gradual revelation of truth, the history of the gradual liberation of our minds from darkness and prejudice."

—George Sarton, from "The History of Medicine Versus the History of Art"

**Are there significant
differences in bioavailability
and clinical predictability
among drug products?**

Opinion

Results of a questionnaire to
7,000 physicians:

44.6%

Agree there is a significant
difference

24.9%

Believe there is no difference

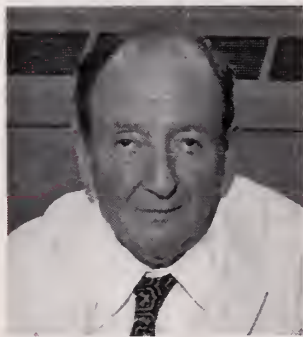
30.5%

Had no opinion

Are there significant differences in bioavailability and clinical predictability among drug products?

Teacher of Medicine

Alfred Gilman, Ph.D.
Wm. S. Lasdon
Professor & Chairman
Department of
Pharmacology
Albert Einstein
College of Medicine of
Yeshiva University



I think that there can be a very great distinction between generic drugs and brand name drugs. And that applies to products of original research that have outlived their patent protection as well as to drugs that have long been in the public domain. Let me explain why.

The Importance of the Manufacturing Environment

In terms of formulation, quality control, and the ability to reproduce an essentially identical product, batch after batch, I doubt that many firms are properly equipped to put out a product that is as carefully controlled as the product marketed by a pharmaceutical company with sophisticated research and high quality manufacturing facilities. For example, when a company comes out with its own preparation of a drug that has just lost its patent protection, there is no assurance that the drug it produces will be a therapeutic equivalent. The raw material could be identical and yet bioavailability might vary from complete unavailability to that which is equivalent to the original.

It Isn't Enough to Meet USP and NF Standards

Meeting USP and NF standards is not enough to guarantee therapeutic equivalence. In certain instances, stricter standards must be applied. Right now, the New York Heart Association has a committee that is studying the problem of digoxin equivalent

lency. I am certain that they are going to recommend a bioavailability assay of a particular digoxin. Unless this is done, they will not recommend it for purchase or use in New York City hospitals. It represents too much of a hazard. They have gone so far as to recommend a batch-by-batch certification of bioavailability even though the company has been reproducing and marketing a digoxin product through the years.

The Problem of Controlling Bioavailability of Generics

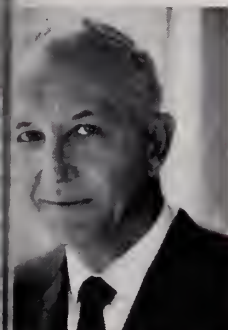
The FDA does not have the manpower to inspect the quality control capabilities of hundreds of houses specializing in generic products. And I don't think that the average pharmacist is knowledgeable or aware of the quality and bioavailability of the infinite numbers of generic preparations. A recommendation has been made that every time a generic house (or for that matter a large pharmaceutical company) markets an already existing drug for the first time, a modified new drug application should be submitted. The manufacturer would have to show that his compound is the therapeutic equivalent of the standard compound in use, assuming that the standard compound is one that has been available for an extended period—say 15 years. This would be one indication that the control of bioavailability is beginning to get the attention that it deserves.

Clinical Predictability More Important Than Price

Although the question of price has been greatly exaggerated, it is true that patients can often save money on generic drugs. But you are not going to dare attempt to save money if it jeopardizes a patient's health. I turn to the example of cardiac glycosides. In recent years, the cardiac glycosides are probably the most drugs we use with the smallest difference between a maximally safe dose and a toxic dose. If you are dealing with a drug of this type, the concern must be clinical predictability. At the time of variations in bioavailability, it would be silly to try to save the what might amount to maybe \$10 or \$20. The physician cannot age his patient and be sure that the drug prescribed has the positive effect expected. This is especially significant when the patient is on the product, not for the product, but for the rest of his life.

Maker of Medicine

Cavallito, Ph.D.
Executive Vice President
First Laboratories



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minimize nonequivalence of drug components produced by different manufacturers. Arguments relate largely to the extent of product inequivalences. Experience over the past six years has uncovered a greater incidence of nonequivalence of products prepared by different manufacturers from generically equivalent substances than many had previously surmised.

Newer Bioavailability Studies Reveal Differences

Bioavailability may be defined as a measure of the rate and amount of absorption of a drug substance from its administered dosage form. For several years pharmaceutical scientists have proposed that bioavailability data on presumably equivalent dosage forms provide the best measure of product equivalence—short of adequate clinical trial. In their continued search for shortcuts to the evaluation of product equivalence, medical and pharmaceutical scientists have increasingly relied upon bioavailability characteristics as reflected by blood levels of a drug after its administration to human subjects.

Leading manufacturers now conduct comparative bioavailability studies on their own product dosage forms after production process changes that would have been considered inconsequential a few years ago. This isn't surprising, since there are so many possible differences in production operations that the opportunities for inequiva-

lent generic and brand name products are numerous—even when the production process begins with identical chemical substances. Moreover, reputable manufacturers are striving to improve *in vitro* control measures, such as dissolution characteristics, which are being related more meaningfully to bioavailability reference data.

As a result of advances in scientific instrumentation and analytical methodology which permit measurements of small quantities of drug substances in the body, our abilities to detect differences in bioavailability and possible therapeutic nonequivalence have appreciably improved.

Product Selection

Based on Patient Response
Improved specifications and standards can better assure the equivalence of drug substances. Manufacturers, compendia and regulatory agencies can all play a part. However, it is the drug product, not the drug substance, that the physician, pharmacist, nurse and patient-customer utilize. How can these indi-

viduals make or influence specific product selections to minimize variations in therapeutic equivalence of multisource drugs? Patients' responses to a drug product provide a basis of experience to aid the physician in his selection of a particular product. The nurse and pharmacist can also help detect patient responses, but ultimate responsibility must remain with the physician.

Reputation of Manufacturer as Basis for Product Selection

The physician, to assure that his patients receive quality health care, must rely upon the capabilities of the reputable pharmaceutical manufacturer who is equipped to develop, prepare and control a quality product of uniform, reliable therapeutic performance. Substitution with purportedly equivalent generic products that are only superficially evaluated by an imitator manufacturer can place the health of the patient secondary to factors of price or convenience for the provider.

Opinion & Dialogue

What is your opinion, doctor?
We would welcome your comments.



The Pharmaceutical Manufacturers Association
1155 Fifteenth Street, N.W., Washington, D.C. 20005

Integument!

Our skin—the human integument—covers us, defines us, protects us. But skin is subject to cuts, burns, abrasions. And infections. Neosporin Ointment fights infection by providing broad antibacterial action against susceptible skin invaders. It contains antibiotics that are rarely used systemically, reducing the risk of sensitization.

INDICATIONS: *Therapeutically*, used as an adjunct to appropriate systemic therapy for topical infections, primary or secondary, due to susceptible organisms, as in:

- infected burns, skin grafts, surgical incisions, otitis externa
- primary pyodermas (impetigo, ecthyma, sycosis vulgaris, paronychia)
- secondarily infected dermatoses (eczema, herpes, and seborrheic dermatitis)
- traumatic lesions, inflamed or suppurating as a result of bacterial infection.

Prophylactically, the ointment may be used to prevent bacterial contamination in burns, skin grafts, incisions, and other clean lesions. For abrasions, minor cuts and wounds accidentally incurred, its use may prevent the development of infection and permit wound healing.

CONTRAINDICATIONS: Not for use in the external ear canal if the eardrum is perforated. This product is contraindicated in those individuals who have shown hypersensitivity to any of the components.

PRECAUTION: As with other antibiotic preparations, prolonged use may result in overgrowth of nonsusceptible organisms and/or fungi. Appropriate measures should be taken if this occurs. Articles in the current medical literature indicate an increase in the prevalence of persons allergic to neomycin. The possibility of such a reaction should be borne in mind.

Complete literature available on request from Professional Services Dept. PML.

NEOSPORIN[®] Ointment

(POLYMYXIN B-BACITRACIN-NEOMYCIN)

Each gram contains: Aerosporin[®] brand Polymyxin B Sfa 5,000 units; zinc bacitracin 400 units; neomycin sulfate m (equivalent to 3.5 mg. neomycin base); special white petr q.s. In tubes of 1 oz. and ½ oz. and ¼ oz. (approx.) foil pa et



Burroughs Wellcome Co.
Research Triangle Park
North Carolina 27709

Minnesota Health Department

Parathion and Other Organophosphate Pesticides

A Medical Emergency

WARREN R. LAWSON, M.D.*

ABSORPTION OF SUFFICIENT quantities of any of the organophosphate pesticides can cause acute intoxication and create a medical emergency. Entry into the body can be by inhalation, ingestion, or absorption through the skin, with the latter being the most common route of entry for the occupationally exposed. Ingestion is the usual route in accidental, suicidal, or homicidal poisonings. Recent restrictions placed on the use of DDT and the related organochlorine pesticides have resulted in a greater reliance upon the organophosphates for pest control. Thus, the opportunity for exposure and the prospect of poisoning has increased greatly.

The organophosphate pesticides as a chemical family share the capability of inhibiting the cholinesterase activity in man. Thus, the diagnosis, treatment, and prevention of poisoning by these chemicals can be considered collectively. As an aid to recognition of these pesticides a list, in decreasing order of hazard, is presented.

Some Organophosphate Pesticides¹

(Estimate of hazard is based on acute dermal and oral toxicity in animals.)

Most Dangerous

TEPP (Bladan; Kilmite 40; Tetron; Vaportone)
phorate (Thimet)
disulfoton, thiometon; dithiosystox (Di-Syston)
paraaxon (E-600; Mintacol)
thionazin, BSI (Nemafos; Cynem)
parathion (E-605; Alkron; Alleron; Etilon; Thiophos, etc)
demeton (Systox)
mevinphos, ISO, BSI (Phosgene; Phosdrin)
EPN
schradan (OMPA; Pestox III; Sytam)
metacide
methyl parathion (Dalf; Metron; Nitrox 80; etc)
azinphos-methyl (Guthion; Carfene; Guthathion M)
monocrotophos (Azodrin; Nureacron, etc)
dicrotophos (Bidrin; Carbicron; Ektafos, etc)

Dangerous

phosphamidon (Dimecron)
carbophenothion (Trithion; Dagadip; Garrathion)
coumaphos (Co-Ral; Asuntol; Muscatox; Resitox)
dichlorvos, DDVP (Vapona)
diazinon, ISO, BSI (Basudin; Diazide; Garden-tox, etc)
ethion (Nialate; NIA 1240)
delnav, dioxathion (Delnav)

Less Dangerous

methyl demeton (Meta-Systox)
dimethoate (Cygon; Daphene; Trimetion, etc)
naled (Dibrom)
Phostex
dicapthion (Di-Captan)
DEF; DeGreen; Ortho Phosphate Defoliant, etc
trichlorfon, ISO, (Dipterex; Tugon, etc)

Least Dangerous

Chlorthion
Ruelene
malathion (Cythion; Karbofos; Malamar, etc)
ronnel (Korlan; Trolene; Viozene, etc)

Workers in agriculture or agricultural services who regularly use the organophosphate pesticides should recognize the potential hazards of working with these chemicals, take appropriate safety precautions, and be under medical supervision. The medical management of such workers should include a pre-exposure and periodic "cholinesterase blood level activity test." A substantial drop from the pre-exposure cholinesterase level is an indication of abnormal exposure to the organophosphates, requires remedial work procedure action, and calls for a period of medical surveillance for the possible development of symptoms. The test requires only a small amount of blood drawn from a finger prick into a heparinized capillary tube. The Minnesota Department of Health will supply mailing kits containing the heparinized tubes to physicians, will run the tests, and resubmit the findings on request and at no charge. However, the test is such that it can be run by most laboratories without difficulty.

In a medical emergency the cholinesterase blood

*Secretary and Executive Officer, Minnesota Department of Health, Minneapolis, Minnesota.

level activity test is more of confirmatory than diagnostic value. Diagnosis depends upon recognition of the rapidly developing signs and symptoms of illness and a history of exposure. Initially the symptoms are not very specific but usually include abdominal pain, headache, nausea, weakness, diarrhea, vomiting, sweating, and pallor. Later they may also include dyspnea, salivation, lacrimation, muscle twitching, convulsions, cyanosis, shock, and cardiac arrhythmias, coma, and death. A positive alleviation of signs and symptoms following initial treatment with atropine is of confirmatory diagnostic value.

Treatment of organic phosphate poisoning may range from simple removal from exposure and observation for developing symptoms to a very rigorous regimen of action. The first step should be one of self protection of physician and those who must handle the patient, especially if the patient's exposure has come from a spill or contaminated clothing. Then there is need for positive pressure artificial respiration and oxygen if cyanosis is present. When color returns, give 2 to 4 mg of atropine intravenously. It should be noted that this dose is about ten times the amount given for other conditions in which atropine is considered therapeutic. The dose should be repeated every five to 10 minutes until signs of atropinization

appear. This condition should be maintained for 48 hours. In severe cases of poisoning 1000-2000 mg of atropine may be required. Pralidoxime chloride (2 PAM, Protopam), if used during the first 24 hours after poisoning, complements the effect of atropine and hastens the reactivation of cholinesterase enzymes. For adults the initial dose of 1 gm should be injected intravenously at a rate of 500 mg per minute. If muscle weakness is not relieved within an hour the dose should be repeated. After supportive treatment is underway the patient should be decontaminated with soap and water, contaminated clothes should be removed from the area, and the area itself decontaminated.

The Minnesota Department of Health has been actively concerned about the health hazards associated with the use of organophosphate pesticides. It routinely processes several hundred blood samples for cholinesterase activity each year. It has provided contract sprayers with good practice procedures for protection against exposure to the organophosphate pesticides, and it recently co-sponsored a short course entitled "Pesticides and Public Health." Further information, advice, or supportive help can be obtained by contacting the department.

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Polonius: What do you read, my lord? . . .

Hamlet: Slanders, sir: for the satirical rogue says here that old men have grey beards, that their faces are wrinkled, their eyes purging thick amber and plumtree gum and that they have a plentiful lack of wit, together with most weak hams: all which sir, though I most powerfully and potently believe, yet I hold it not honesty to have it thus set down, for yourself, sir, should be as old as I am, if like a crab you could go backwards.*

*Shakespeare, Hamlet. II.ii.

State Health Department Names Assistant Executive Officer

Ellen Z. Fifer, M.D., has been appointed executive officer for programs of the Minnesota Department of Health. The new position was created at the recommendation of the governor's Loaned Executives Action Program (LEAP) as part of a reorganization of the department.

Criteria of Cerebral Death

PRIV. DOZ. DR. C. KÄUFER*

FUNCTIONAL LOSS OF an essential organ initiates the process of dying, leading to disintegration of the whole organism. Death occurs when this stage becomes irreversible. In the Federal Republic of Germany, authorities unanimously regard cerebral death as the decisive criterion for human death.⁹ Knowing when cerebral death occurs is important because a dying patient's organs may be needed for transplantation. The nearer to death the organs are removed, the better the chances for an effective transplantation.

Definition

If cerebral death is defined as the *irreversible functional loss of the whole brain*, that is, cortex and brain stem, then cerebral death coincides with human death, because the personality of man is linked to the functions of his brain. Brain death, therefore, is identical with the death of the individual. If such a stage is reached, resuscitative measures may be stopped, even if the heart is still beating.

This has been difficult for some to accept, since a beating heart has always meant life. To compound the difficulty that the *reliability of diagnostic procedures* for determining brain death has uncertainties. Difficulties can be troublesome when someone has to decide when to remove an organ in order to transplant it.³

Criteria

The sequence to establish cerebral death are generally agreed upon today. Three diagnostic criteria exist.

1. clinical cerebral death
2. the electroencephalogram
3. serial angiography of the large cerebral arteries.

Complete coma, cerebral areflexia and the loss of brain-stem controlled spontaneous respiration determines the clinical picture of cerebral death. Loss of reflexes and complete atony are not es-

sential for the diagnosis. Spinal reflexes and spinal tone may be present or recur after recovery from spinal shock. We therefore talk about cerebral loss of reflexes only, including the complete loss of cerebral reactions to any stimuli.¹⁰

Electroencephalography

Electroencephalography can substantiate neurological findings, but it cannot prove cerebral death. Cerebroelectrical silence characterizes death even when the encephalogram is greatly amplified.

Iso-electrical EEG should not be confused with a flat EEG, as it still is. Flat EEG's occur in about 10% of the healthy population. An iso-electrical EEG obtained under strict conditions reveals a loss of functions of the cerebral cortex without indicating whether this is reversible or permanent. Most of all, such a cortex with electrical silence does not allow any conclusions on the functions of subcortical structures.

Frozen Lake Comparison

Electrical conditions may be compared to a frozen lake, where the surface is still regardless of possible water movements below the ice. The iso-electrical EEG is, therefore, insufficient to indicate brain-stem status. Its value for determining cerebral death is therefore limited. Regardless of the time of an iso-electrical pattern, it can not serve as proof of brain death. All discussions on how long an EEG has to be iso-electrical until cerebral death is proven are therefore fruitless. Long durations of an iso-electrical pattern do not increase its value in the diagnosis.⁵

The EEG is, however, indispensable,⁷ since further investigations, angiography for instance, are not carried out as long as residuals of cortical activity are observed. Thus, the EEG has become the most important indicator for the next diagnostic procedure.

Serial Angiography

Cerebral death is diagnosed with greatest ac-

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curacy through the *serial-angiography of the cerebral vessels*. By means of intracranial interruptions of blood flow, angiography shows typical changes indicating loss of brain functions. This diagnostic procedure should, however, not be limited to the distribution area of the internal carotid artery because it is not representative for the state of the brain-stem. The proof of circulatory arrest, therefore, must include vascular supply of cortex and brain-stem. Angiography should include simultaneous or successive filling of the basilar artery via the vertebral-circulation. This postulation is underlined by the observation of a 60 year old female with scarce visual and oculo-motor defects, where the entire cerebral circulation was only maintained via the right vertebral artery. Here both carotid arteries were occluded.

Transfemoral Approach

We carry out the necessary filling of the carotid

and vertebral arteries by transfemoral catheterangiography with selective probing of the four cerebral vessels. In our experience this method is simple and time saving because all vessels may be entered in one procedure. Following cerebral angiography, kidney and hepatic arteries can be filled with the same catheter and by this the topographic situation clarified for prospective transplantations.^{1,6}

Circulatory Stops

Criterion for correct carotid angiography is the delayed but complete filling of the extracranial internal carotid artery following the external carotid artery. The contrast interruption usually occurs in the syphon area. For the vertebral artery, the typical stop is localized at the atlanto-occipital level. Radiological localization of the stop, however, not always occurs in this area or at the base of the skull. Occasionally the stop is



Fig. 1—Carotid angiography in cerebral death: After introducing the Seldinger catheter into the common carotid artery 15 ml of contrast medium are injected. The external carotid artery shows a complete and unchanged filling. The internal carotid artery only shows a delayed filling. There is an abrupt stop of flow in the extracranial part of the internal carotid artery. There is no filling of intracerebral vessels even in late films of the series.

localized in the cervical section of the vessel.

In our experience, stop of cerebral circulation first takes place in the carotid artery while there is still a flow in the vertebral vessels. This may be considerable and even maintain an almost normal EEG even if the carotid vessels are occluded.

While a circulatory interruption can be diagnosed without doubt, the interpretation of angiograms with rudimentary filling presents difficulties. The question is whether the incompletely outlined branches of the middle or posterior cerebral artery may still be regarded as minimal intracranial blood flow, or whether the contrast medium is being pressed into the vessels by the increased injection pressure, simulating a flow.

This pressure-mechanical theory is substantiated by comparative panangiographic series, in which no vascularisation of these areas could be obtained. As, however, the possibility of intracerebral minimal flow cannot be excluded we are careful in judging such rare pictures presently because of the limited experience.

As time elapses from the first registration of an iso-electric EEG, one observes a continuous lowering of the radiological stop. Branches of the internal carotid artery filled at an earlier angiography and their lack of contrast in later controls indicate a progressive increase of cerebrovascular resistance. Circulatory stoppage at the base of the skull or proximal from there represents the final stage of this development, where no filling of smaller cerebral arteries is possible even with increased pressure injections. Therefore, *the timing of angiography* is essential for the diagnosis.

Timing of Angiography

Considering the interval of circulatory arrest between the carotid and vertebral artery, the timing of angiography has shifted from the carotid to the vertebral arteries. It appears unsuitable to perform the study immediately upon obtaining an iso-electric EEG, as intracranial circulation may still be present at that time. It is best carried out when body temperature and blood pressure drop



Fig. 2—Angiogram of the vertebral artery: Normal contrastation in the cervical part of the vessel. Stop of the contrast column at the atlanto-occipital level. No filling of intracranial branches.

and the initially decreased arterio-cerebrovenous oxygen difference rises again.

Conclusions

Since cerebral death can be proven by angiography, we feel that the diagnostic angle of the problem has been solved. We are presently trying to obtain more data by means of a differentiated documentary catalogue and hope to gain important side results, for instance an answer to the question, whether cerebral panangiography alone is permissible. This would make it possible to establish the

diagnosis at an earlier time and enable us to perform organ transplants under even more favorable conditions.

In all these considerations the health of our patients should never be neglected. Intensive treatment is our first aim: it is being continued until brain death has been proven. On the other hand the chance to obtain an organ donor should not be missed in view of the large number of patients in need for organ transplantation. It was the purpose of this presentation to show that brain death can be proven beyond any doubt.

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Failure to Diagnose Tuberculosis

A physician treated a patient from December through April for chest congestion and a cold. The patient requested a chest Xray. The physician did not have one taken.

Later, the patient was x-rayed for workmen's compensation purpose for a mild chest injury and was found to have tuberculosis. He was subsequently confined to a sanitarium for a year, lost one year in wages.

The judge directed a verdict in favor of the physician who testified, that tubercu-losis was difficult to diagnose and that treatment of the patient was reasonable under the circumstances. The patient was not allowed to recover damages from the physician.

Theodore A. Peterson, M.D.
Minneapolis, Minnesota

La Londe v. Permanente Medical Group (Cal. Super. Ct., Sacramento Co., Docket No. 188631, June 1, 1972).
The Citation 26:8, February 1, 1973.

Psychologically Induced "Scotomata"

White Physician vs. Black Patient

EDWARD W. POSEY, M.D.*

AT THE TURN OF THE century, on a continent where there were few representatives of what is now America's largest racial minority, Sigmund Freud developed a theory for understanding and treatment of psychiatric problems related to the psychosocial ills of the predominantly Jewish and Catholic population of Vienna. Today the method which he proposed is being questioned by those for whom it was to some degree beneficial and even more by those for whom it had virtually no applicability. His technique is not the only means to alleviate the suffering of psychiatric patients.

In 1954, America was suddenly faced with a change in the status quo by the ruling of the Supreme Court to proceed with desegregation of its public schools. This bold step aroused feelings of anxiety, fear, and guilt in the majority; and stimulated the minority to question the system which for more than 300 years had accorded them second class or lower status.

I, a black psychiatrist, am sensitive to problems created by interpersonal stress, to the stresses of our rapidly changing society, and to those created by the psychosocial evil bearing the label of racism.

I think white physicians have "scotomata" when faced with the task of giving total care to minority people; the psyche of the patient is neglected. The expectation is that the minority patient will fit the stereotyped mold of being inferior intellectually, physically, and morally. The patient must be submissive, compliant, passive, and above all, grateful for the services which he is receiving.

Social variables generally influence the mental behavior of any culture. Substandard housing, unemployment, poor recreational facilities, inferior educational and cultural programs, and inadequate delivery of health services adversely affect the minority.

Over-valuation of one group jeopardizes the mental health of others. Cultural disadvantages can be devastating to the mental equilibrium of

minority group members.

Regression to a lower functional level occurs with resultant incapacity due to physical or mental illness. Many patients have masked their marked dependency needs by compensatory life styles. Minority patients, in most instances, have not been able to utilize these defenses because of the limitations imposed by the society in which they have to live. It follows then that the regression becomes intensified in the minority due to their limited coping defenses. They expect the physician, who has always been thought of as the "wise father," to understand their needs. "Scotomata," (in some cases blindness) caused by unrealistic attitudes on the part of the white physician, limits the physician's ability to establish this kind of relationship. Having been made exquisitely sensitive to rejection by the many years of being denied full acceptance in our society, the minority patient either openly rebels or uses passive-aggressive maneuvers to support his position in the struggle to gain acceptance and understanding by his white physician. Unaware of his unconscious racial attitudes, the white physician may assume that the patient is uncooperative and too demanding reinforcing the minority person's paranoid ideation.

White physicians must remember that events such as birth, marriage, and death are emotionally charged experiences in minorities as they are in the lives of the majority. The reason for an unwanted pregnancy in a minority patient may well be due to unexpressed anxiety created by the distinct possibility that after delivery the mother will not be able to provide the new arrival with the necessities of life. Her husband is barely able to provide for those who are already his responsibility. The white physician, who is cognizant of this and other problems of the minority will then consider the realities of his patient's situation rather than attaching to her observable behavior, the label of a more malignant psychiatric disorder.

As with birth, marriage with its many neurotic and intense relationships often creates behavioral change in minorities which to the uninformed ob-

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server might appear as a psychiatric problem. Stress contributes to the clinical picture of depression or anxiety.

Death to many people is not considered final. It is the time when the deceased will rest in peace after years of labor in a cruel world where acceptance as a person was never known. The remaining close relatives most likely have ambivalent feelings about their loss. They experience guilt for not sharing the expected attitude of their own subculture as to the deserved final rest of the deceased; and they might be angry because the emotional and financial support which the deceased once was able to give will no longer be available.

It requires psychological sophistication to be-

come aware of these feelings even when one is a part of the accepted group. What can a white physician prescribe when faced with obvious psychiatric problems in minority patients? The minority patient is a fellow human being in need of scientific and medical knowledge and skill to aid in the relief of his suffering. He requires, as the white patient requires, evaluation of areas of stress which if understood might resolve the presenting complaints. All the fluids, antibiotics, and drugs in the medical armamentarium will not heal the wounds or remove the scars of discrimination and prejudice. The eradication of physicians' blind spots where minorities are concerned will decrease the psychiatric problems of the minority.

Death thou has seen
In his first shape on man; but many shapes
Of Death, and many are the wayes that lead
To his grim Cave . . .

Immediately a place
Before his eyes appeard, sad, noysom, dark,
A Lazar-house it seemd, wherein were laid
Numbers of all diseas'd, all maladies
Of gastly Spasm, or racking torture, qualmes
Of heart-sick Agonie, all feavorous kinds,
Convulsions, Epilepsies, fierce Catarrhs,
Intestin Stone and Ulcer, Colic pangs,
Daemoniac Phrenzie, moaping Melancholie
And Moon-struck madness, pining Atrophie,
Marasmus, and wide-wasting Pestilence,
Dropsies, and Asthma's, and Joint-racking Rheums.*

*John Milton: Paradise Lost, Book XI, 466-488. (1667)

Diplomacy is to do and say the nastiest thing in the nicest way.—Isaac Goldberg.

Maybe the patient's self-diagnosis is right. He could have hay fever. But that bright red nasal mucosa, along with the thick discharge and excoriation around the nares, strongly suggests that the main problem is a cold. Hay fever or another form of allergic rhinitis may or may not be an underlying factor.

If a complete history and examination rule out allergic rhinitis, the long-term outlook will be a lot more favorable than his own "diagnosis" would have indicated.

But right now, whether he's got allergic rhinitis or a cold, he's suffering from the same irritat-

ing symptoms of drip, congestion and stuffiness. Try DIMETAPP EXTENTABS®. They're formulated to relieve these symptoms without much chance of causing drowsiness or overstimulation. Your patients will appreciate the 24-hour relief they can get from just one tablet every 12 hours.

Cold or



Allergy?

Whether it's a cold or an allergy, Dimetapp Extentabs® effectively relieve stuffiness, drip and congestion.

INDICATIONS: Dimetapp Extentabs are indicated for symptomatic relief of allergic manifestations of upper respiratory tract disease, such as the common cold, seasonal allergies, sinusitis, rhinitis, conjunctivitis and otitis. In these cases it quickly reduces inflammatory edema, nasal congestion and excessive upper respiratory secretions, thereby affording relief from nasal stuffiness and postnasal drip.

CONTRAINDICATIONS: Hypersensitivity to antihistamines of the same chemical class. Dimetapp Extentabs are contraindicated during pregnancy and in children under 12 years of age. Because of its drying and thickening effect on the lower respiratory secretions, Dimetapp is not recommended in the treatment of bronchospasm. Also, Dimetapp Extentabs are contraindicated in concurrent MAO inhibitor therapy.

WARNINGS: Use in children: In infants

and children particularly, antihistamines in overdosage may produce convulsions and death.

PRECAUTIONS: Administer with care to patients with cardiac or peripheral vascular diseases or hypertension. Until the patient's response has been determined, he should be cautioned against engaging in operations requiring alertness such as driving an automobile, operating machinery, etc. Patients receiving antihistamines should be warned against possible additive effects with CNS depressants

such as alcohol, hypnotics, sedatives, tranquilizers, etc.

ADVERSE REACTIONS: Adverse reactions to Dimetapp Extentabs may include hypersensitivity reactions such as rash, urticaria, leukopenia, agranulocytosis, and thrombocytopenia; drowsiness, lassitude, giddiness, dryness of the mucous membranes, tightness of the chest, thickening of bronchial secretions, urinary frequency and dysuria, papilledema, hypertension, hypotension, headache, dizziness, drowsiness, timidity, incoordination, visual disturbances, mydriasis, CNS depressant and less often stimulant effect, anorexia, nausea, vomiting, diarrhea, constipation and dyspepsia, etc.

HOW SUPPLIED: Light blue Extentabs in bottles of 100 and 300.

Dimetapp Extentabs®

Dimetane® (brompheniramine maleate), 12 mg.; phenylephrine HCl, 15 mg.; phenylpropanolamine HCl, 15 mg.

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For the patient with a terminal illness, PAIN past, present, and future can dominate his thoughts until it becomes almost an obsession. The more he is aware of the pain he is now experiencing, the more difficult it is to erase his memory of yesterday's pain, and to allay his fearful anticipation of tomorrow's pain.

Surely the last thing this patient needs is an analgesic containing caffeine to stimulate the senses and heighten pain awareness. A far more logical choice is Phenaphen with Codeine. The sensible formula provides $\frac{1}{4}$ grain of phenobarbital to take the nervous "edge" off, so the rest of the formula can help control the pain more effectively. Don't you agree, Doctor, that psychic distress is an important factor in most of your terminal and long-term convalescent patients?

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Phenaphen[®] with Codeine

Phenaphen with Codeine No. 2, 3, or 4 contains: Phenobarbital ($\frac{1}{4}$ gr.), 16.2 mg. (warning: may be habit forming); Aspirin ($2\frac{1}{2}$ gr.), 162.0 mg.; Phenacetin (3 gr.), 194.0 mg.; Codeine phosphate, $\frac{1}{4}$ gr (No. 2), $\frac{1}{2}$ gr (No. 3) or 1 gr (No. 4) (warning: may be habit forming).

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Ⓜ Phenaphen with Codeine is now classified in Schedule III, Controlled Substances Act of 1970. Available on written or oral prescription and may be refilled 5 times within 6 months, unless restricted by state law.

A. H. Robins Company, Richmond, Va. **A-H-ROBINS**

Relationships between Medical Education in Minnesota and Professional Location*

WINSTON R. MILLER, M.D. AND RUSSELL N. HILL, Ph.D.

PUBLIC SUPPORT has led to the development of two new Medical Schools affiliated with the University of Minnesota and a greatly expanded enrollment at the Medical School on the Minneapolis campus. It is anticipated that a great many, if not most, of the graduates of these schools will practice in Minnesota. Previous studies have shown that about half of the practicing physicians in Minnesota received their M.D. degrees from the University of Minnesota, and that about half of all M.D. graduates of the University of Minnesota had professional locations in Minnesota.¹ Since it is known that the location of internship and/or residency has a significant effect on professional location, this study was undertaken to examine these relationships in some detail.

In a study at the University of Kansas School of Medicine, internship and residency training in Kansas were shown to be "significantly correlated with eventual practice in Kansas."² Of the physicians participating in the study, 45 percent were practicing within 200 miles of their internship location. Of those who completed a residency in Kansas, 50 percent remained in Kansas to practice.

A study of all medical school graduates for the years 1945 and 1950 showed that 59 percent of 1945 graduates were practicing in the same state in which their residency training occurred, compared to 63 percent of 1950 graduates.³ The same

study found that 42 percent of 1945 graduates were practicing in the same state as the location of their internship, compared to 48 percent of 1950 graduates.

Data for the present study were extracted from AMA records on all living physicians who had ever been enrolled in an internship or residency in Minnesota and included the following: the institution and year(s) of enrollment in internship and/or residency, the medical school and year of graduation, the current specialty, and the current address. Current interns and residents were excluded.

Current Location of Previous Minnesota Interns by Year of Internship

Table 1 shows present location of previous interns according to year of internship. Although only 40 percent of all former Minnesota interns are now located in Minnesota, the percentage appears to be considerably higher for 1970-71. The prominent migration to western states (principally California) seems to have decreased sharply since 1960. However, this decrease was counter-balanced by an increase of migration to eastern states and other countries. Furthermore, there was a decrease in retention of physicians within Minnesota.

Current Location of Previous Minnesota Interns by Internship Institution

Data in Table 2 show little differences in geographic distribution among alumni of the different institutions except for the 19 alumni of the re-

*This study was supported by HEW Grants 5 GO3 RM-00021 to Northlands Regional Medical Program, Inc. Opinions represent views of the authors and do not constitute endorsement by HEW or NRMP. Dr. Miller is Program Director of NRMP; Dr. Hill is Evaluation and Data Officer.

TABLE 1
Percentage Distribution of Current Locations of Physicians
with Previous Internships in Minnesota—By Selected Time Periods*

Time of Internship	Minnesota	Other Midwest	East	South	West	Other Countries
Before 1930 (N=537)	43	16	5	8	27	1
1930-1939 (N=924)	41	19	5	9	26	2
1940-1949 (N=1193)	36	23	5	9	27	1
1950-1959 (N=1464)	41	19	7	9	22	2
1960-1969 (N=1629)	37	19	12	9	18	5
1970-1971 (N=216)	53	16	8	10	8	6
TOTAL (N=5963)	40	19	8	9	22	3

*Percentages shown in all tables may not total 100 due to rounding.

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cently inaugurated internship at the VA Hospital. The marked difference from the other institutions may be a transient phenomenon.

areas do not show any particular patterns except that more Mayo alumni locate in foreign countries.

TABLE 2
Percentage Distribution of Current Locations of Physicians
with Previous Internships in Minnesota—By Institution

Institution	Minnesota	Other Midwest	East	South	West	Other Countries
Mayo Clinic (N=38)	40	8	11	13	21	8
U of M Hospital (N=1325)	33	11	15	15	24	2
V.A. Hospital (N=19)	90	5	5	—	—	—
Hennepin County (N=1146)	39	16	5	8	28	4
St. Paul-Ramsey (N=1038)	38	23	3	7	27	2
Other (N=2397)	44	24	7	6	17	3
TOTAL (N=5963)	40	19	8	9	22	3

Current Location of Previous Minnesota Residents by Year of Residency

The geographic distribution for residents was similar to that for interns (Table 3), showing a decrease in migration to the West since 1960, an increase to the East and other countries, and a decrease in retention in Minnesota. Relatively more residents than interns migrated to southern states, but the over-all average retention in Minnesota was identical.

Current Location of Physicians Enrolled in More Than One Component of Medical Education in Minnesota

Sixty-four percent of Minnesota M.D. graduates who also took internships and residencies in Minnesota have remained in the state (Table 5). Nearly as many Minnesota graduates stayed if they had either an internship or a residency in Minnesota. Nearly half of out-of-state graduates with an internship and a residency in Minnesota are

TABLE 3
Percentage Distribution of Current Locations of Physicians
with Previous Residencies in Minnesota—By Selected Time Periods

Time of Residency	Minnesota	Other Midwest	East	South	West	Other Countries
Before 1930 (N=47)	47	13	2	9	28	2
1930-1939 (N=257)	44	17	7	11	21	2
1940-1949 (N=873)	43	15	5	10	26	1
1950-1959 (N=1491)	42	16	9	9	23	1
1960-1969 (N=2927)	35	16	11	14	18	7
1970-1971 (N=668)	49	10	9	15	8	9
TOTAL (N=6263)	40	15	9	12	19	5

Current Location of Previous Minnesota Residents by Institution

Hennepin County Hospital showed the highest percentage retention of former residents, and the Mayo Clinic showed the lowest (Table 4). The 22-point difference suggests fundamental differences between these institutions. However, when the actual numbers of physicians are compared, the Mayo Clinic contributed 758 physicians to the Minnesota pool while Hennepin County Hospital contributed 166. The University of Minnesota, with 45 percent retention, contributed the largest number—785. Differences in location in other

still located in the state. This percentage is similar to the overall retention of graduates of the University of Minnesota School of Medicine.¹

Current Location of Previous Minnesota Residents by Specialty

Over 50 percent retention occurred in the specialties of Therapeutic Radiology, Physical Medicine, and Obstetrics-Gynecology (Table 6). Less than 30 percent retention occurred in Thoracic Surgery, Plastic Surgery, Orthopedic Surgery, Dermatology and Unspecified Specialty.

All remaining specialties fell within a plus or minus range of 10 percent around the average c

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TABLE 4
Percentage Distribution of Current Locations of Physicians
with Previous Residencies in Minnesota—By Institution

Institution	Minnesota	Other Midwest	East	South	West	Other Countries
Mayo-Clinic (N=2360)	32	15	10	16	20	7
U of M Hospital (N=1753)	45	13	11	11	18	3
V.A. Hospital (N=736)	47	17	5	9	18	5
Hennepin County (N=310)	54	11	4	7	22	2
St. Paul-Ramsey (N=262)	39	20	6	10	23	2
Others (N=842)	39	22	8	9	19	3
TOTAL (N=6263)	40	15	9	12	19	5

TABLE 5
Percentage Distribution of Current Locations of Physicians
Enrolled in Various Combinations of Educational Programs in Minnesota

Educational Background	Minnesota	Other Midwest	East	South	West	Other Countries
MD Elsewhere, Internship and (N=2363) Residency in Minnesota	48	14	7	9	20	2
MD and Internship in Minnesota (N=2604)	60	10	4	5	20	1
MD and Residency in Minnesota (N=1788)	60	10	4	6	19	2
MD, Internship and Residency in (N=1089) Minnesota	64	9	4	5	17	1

40 percent. When data on the *Primary Physician Specialties* of General Practice, General Internal Medicine, General Pediatrics and Obstetrics-Gynecology were combined, the retention percentage was 43.1 percent—3.3 percent above the overall average. Only 30 percent of all specialties were in these four primary fields.

Discussion

A previous study showed that about one-half of all graduates of the University of Minnesota Medical School located somewhere in Minnesota.¹ This study shows that when Minnesota M.D. graduates enrolled in *either* an internship *or* a residency in Minnesota, retention rose to 60 percent. When they enrolled in *both* an internship *and* a residency, retention rose to 64 percent. Nearly half of all graduates from other medical schools who enrolled in *both* an internship *and* a residency in Minnesota remained in the state—a total of 1137 physicians.

When internship and residency enrollments were considered separately without regard to school of graduation, only a 40 percent retention occurred in each group. Studied over time, the data showed remarkable similarity for periods covering more than four decades. Retention

dropped moderately in the 1940's and in the 1960's, but seemed to rise markedly for the one year of 1970-71. The significance of the latter may be questioned due to the frequent AMA time lag for updating current addresses.

Moderate differences occurred between the various institutions. Hennepin County Hospital, reputed to have close relationships with both the practicing and the academic communities, had the highest percentage retention. The Mayo Clinic, noted for its national and international reputation, had the lowest percentage retention. However, numerically the Mayo Clinic was second only to the University of Minnesota (758 and 785 respectively).

Physicians who did not locate in Minnesota are widely distributed all over the United States and in foreign countries. Only about one-fourth of them are located in the Middle West. The West attracted many physicians who had trained in Minnesota during the years of heavy westward migration. This was apparently not just a western attraction, for when western migration decreased in the 1960's, increased migration occurred to other areas.

Analysis of location by specialty showed simi-

TABLE 6
Location of Physicians with Previous Residencies
in Minnesota—By Current Specialty

Specialty	Total Number	Percentage Minnesota	Distribution of Present Location Midwest	Elsewhere
General Practice	348	47	19	34
Medical Specialties				
General Internal Medicine	951	42	15	43
Aerospace Medicine	8	38	13	50
Allergy	27	44	11	44
Cardiovascular Disease	196	37	14	50
Dermatology	156	28	22	50
Gastroenterology	73	40	12	48
Neurology	213	39	11	50
Occupational Medicine	24	33	13	54
Physical Medicine	68	52	12	37
Preventive Medicine	6	33	—	67
Psychiatry	302	45	10	45
Public Health	26	35	46	19
Pulmonary Disease	60	43	18	38
Surgical Specialties				
General Surgery	660	37	17	46
Anesthesiology	288	47	17	37
Colon & Rectal Surgery	34	44	15	41
Neurosurgery	138	33	16	51
Ophthalmology	219	44	15	41
Otorhinolaryngology	132	40	13	47
Plastic Surgery	38	24	13	63
Thoracic Surgery	100	22	18	60
Urologic Surgery	198	35	14	51
Orthopedic Surgery	335	28	17	54
Pediatric Specialties				
General Pediatrics	314	35	14	51
Pediatric Allergy	13	39	15	46
Pediatric Cardiology	33	39	12	49
Psychiatry, Child	41	34	15	51
Obstetrics & Gynecology	252	51	13	36
Pathology, General	274	44	19	38
Forensic Pathology	5	40	—	60
Radiology, General	306	41	18	41
Diagnostic Radiology	67	36	15	49
Therapeutic Radiology	28	54	14	32
Unspecified Specialty	68	28	13	59
Other Specialties	262	39	11	50
TOTAL	6,263	40	15	45

lar retention percentages for most of the 37 different specialists. The data do not indicate that Minnesota has been training excessive numbers of subspecialists for location in other areas of the country.

Minnesota seems to have accepted a social imperative to train more physicians and to retain as many of them as possible for practice in the state. Although combined emphasis on complete undergraduate and graduate education, *in* Minnesota and *for* Minnesotans, would probably help to achieve this goal, the ultimate desirability of a professional pool consisting almost entirely of

locally trained physicians may be open to question. Many educators and practitioners feel that a mixture of educational backgrounds is desirable for an optimum pool of any kind of professional. Fifty percent retention of graduates of other medical schools warrants continuation and even expansion of these programs. Expansion of graduate educational opportunities for Minnesota graduates should probably not be achieved by preferential selection, thus reducing the number of positions offered for out-of-state graduates. There is an evident need for an absolute increase in opportunities for graduate medical education.

See References 1-3 on page 336.

120th Annual Meeting
Minnesota State Medical Association
Preliminary Scientific Program Synopsis
May 24 and 25
Raddisson South-Minneapolis

(Continued from page 266)

May 25: Daily Practice in Society

Clinical practitioners and behavioral scientists will discuss the problems of practicing medicine in contemporary society.

- 9:00-10:30 a.m. *Session V: Patient Education: The Basis of Quality Practice*
Session Leader: Donnell D. Etzwiler, M.D., Clinical Assistant Professor of Pediatrics, University of Minnesota, Minneapolis
- Experience in a prototype of patient education: Diabetes Education Center, Minneapolis
 - How to use current educational concepts and methods in designing patient education in your practice
 - Physicians, health educators, patients, and third-party payers, cooperating for improved health care
- 11:00-12:20 a.m.-p.m. *Session VI: Children in Trouble: The Early Years*
Session Leader: Francis S. Wright, M.D., Associate Professor of Pediatric Neurology, University of Minnesota, Minneapolis
- Developmental problems, behavior disorders, learning difficulty, and family stress syndromes as they affect the treatment of children
 - Early identification and appropriate management
- 1:40- 3:00 p.m. *Session VII: Problems of Aging*
Session Leader: Floyd K. Garetz, M.D., Associate Professor of Psychiatry, University of Minnesota, Minneapolis
- Psychological changes, common psychiatric problems, medical gerontology, the inner life of the aged
 - Medical management of an aged population
- 3:30- 5:00 p.m. *Session VIII: The Personal Life of the Physician*
- 1:40- 2:20 *Session IX: Medical, Psychological and Social Hazards of the Abortion*
Session Leader: Fred E. Mecklenburg, M.D., Obstetrics-Gynecology, Minneapolis
- 2:20- 3:00 *Session X: Preabortion and Postabortion Counseling*
Session Leader: Fred A. Lyon, M.D. Obstetrics-Gynecology, Minneapolis
- 3:30- 5:00 *Session XI: The Abortion Procedure*
Session Leader: P. Theodore Watson, M.D., Obstetrics-Gynecology, St. Paul
- The abortion procedure in the first trimester, Jane E. Hodgson, M.D., St. Paul
 - The abortion procedure in the second trimester, Robert Goodlin, M.D., Stanford

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(Continued on page 336,

Alcoholism

Some Dynamics and Goals in Treating Alcoholism

REV. VERNON E. JOHNSON, D.D.*

"THE ALCOHOLIC is in a clash by himself," aptly describes the problem. There is loneliness, desocialization from others, plus internal conflict. A set of unpredictable or compulsive behavior clashing repeatedly with his values cause this conflict.

Treatment at St. Mary's Hospital rests on these premises: (1) First, dependence upon alcohol results in self-destructive, or other-destructive behavior. The goal is to isolate this problem—this pathologic relationship to chemicals—throughout the treatment. (2) Two, a rigid set of defense mechanism blocks the patient's insight into his harmful relationship to the chemical. (3) Three, distortion of memory, coma, or blackout may further impair the patient's insight. (4) Subconscious moral conflict progressively burdens him with anxiety and guilt. This causes him to drink to feel normal."

Treatment Design

The treatment design, then, sets itself to meet and to deal with this pathology in the following ways: (1) First identification of the chemical dependency syndrome. One important goal here is the removal of the feelings of uniqueness which the patient has upon arrival. This is done through a series of lectures, films, and recommended reading.

2. The treatment seeks to have the patient identify and accept the specific forms of defenses he uses to impair his judgment which lock him in stereotyped self-destructive behavior. Peer-group therapy sessions held two hours daily help him recognize these defenses.

One-to-one counseling sessions help him eval-

uate his defensiveness.

3. When his defenses have been breached, and his negative emotional life is exposed, the final phase of this portion of treatment is entered, namely, the patient's identification and acceptance of the reality of his own specific negative and destructive attitudes.

This is accomplished chiefly within the peer-group sessions each day, wherein other patients and the counselor confront by description such attitudes as hostility, fear, self-pity, and resentment.

Whenever possible, persons close to the patient are included in sessions with counselor and patient. Regular one-to-one sessions with the counselor are held.

The goal is to have the patient recognize that his moral conflicts are the signs of his sickness, that upon their resolution depends his recovery, that he must enter consciously and consistently into behavior patterns which are agreeable to his value system, and that he regains adequate ego strength and emotional health.

Outpatient Program

St. Mary's plan includes a two-year outpatient program of treatment.

In this period, the patient is encouraged to make use of the counseling available. He is assigned with his spouse to a weekly therapy group designed around the goals of rehabilitation. He is encouraged to affiliate with Alcoholics Anonymous, the principles of which he was introduced to as an inpatient.

From the day of his admission to hospital to the conclusion of the outpatient period, he is seen as moving from a locked-in negative internal environment toward the freedom of a normal range of feelings and emotions.

*President of the Johnson Institute which is consultant to Alcoholism Unit, St. Mary's Hospital, Minneapolis.

Given as part of a Symposium on the "Treatment of the Hospitalized Alcoholic" which was presented to the combined meeting of the Mayo Clinic Staff and the Zumbro Valley Medical Society on November 4, 1970.

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References

Medical Education in Minnesota and Professional Location—Miller and Hill (page 332).

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3. Weiskotten HG et al.: Trends in medical practice. J Med Pract 35:12:1086, 1960.

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Precautions: The enzyme's optimal pH range is 7 to 8. Lower pH conditions have a definite adverse effect on the enzyme's activity, and appropriate precautions should be taken.

The enzymatic activity is also adversely affected by detergents and hexachlorophene and heavy metal ions such as mercury and silver which are used in some antiseptics. When it is suspected such materials have been used, the site should be carefully cleansed by repeated washings with normal saline before Santyl Ointment is applied. Soaks containing metal ions or acidic solutions such as Burow's solution should be avoided because of the metal ion and low pH. Cleansing materials such as hydrogen peroxide or Dakin's solution do not interfere with the activity of the enzyme.

Deilitated patients should be closely monitored for systemic bacterial infections because of the theoretical possibility that debriding enzymes may increase the risk of bacteremia.

The ointment should be confined to the area of the lesion in order to avoid the risk of irritation or maceration of normal skin.

A slight erythema has been noted occasionally in the surrounding tissue particularly when the enzyme ointment was not confined to the lesion. This can be readily controlled by protecting the healthy skin with a material such as Lassar's paste.

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(4) Crosshatching thick eschar with a #11 blade is helpful. It is also desirable to remove as much loosened detritus as can be done readily with forceps and scissors.

(5) All excess ointment should be removed each time dressing is changed.

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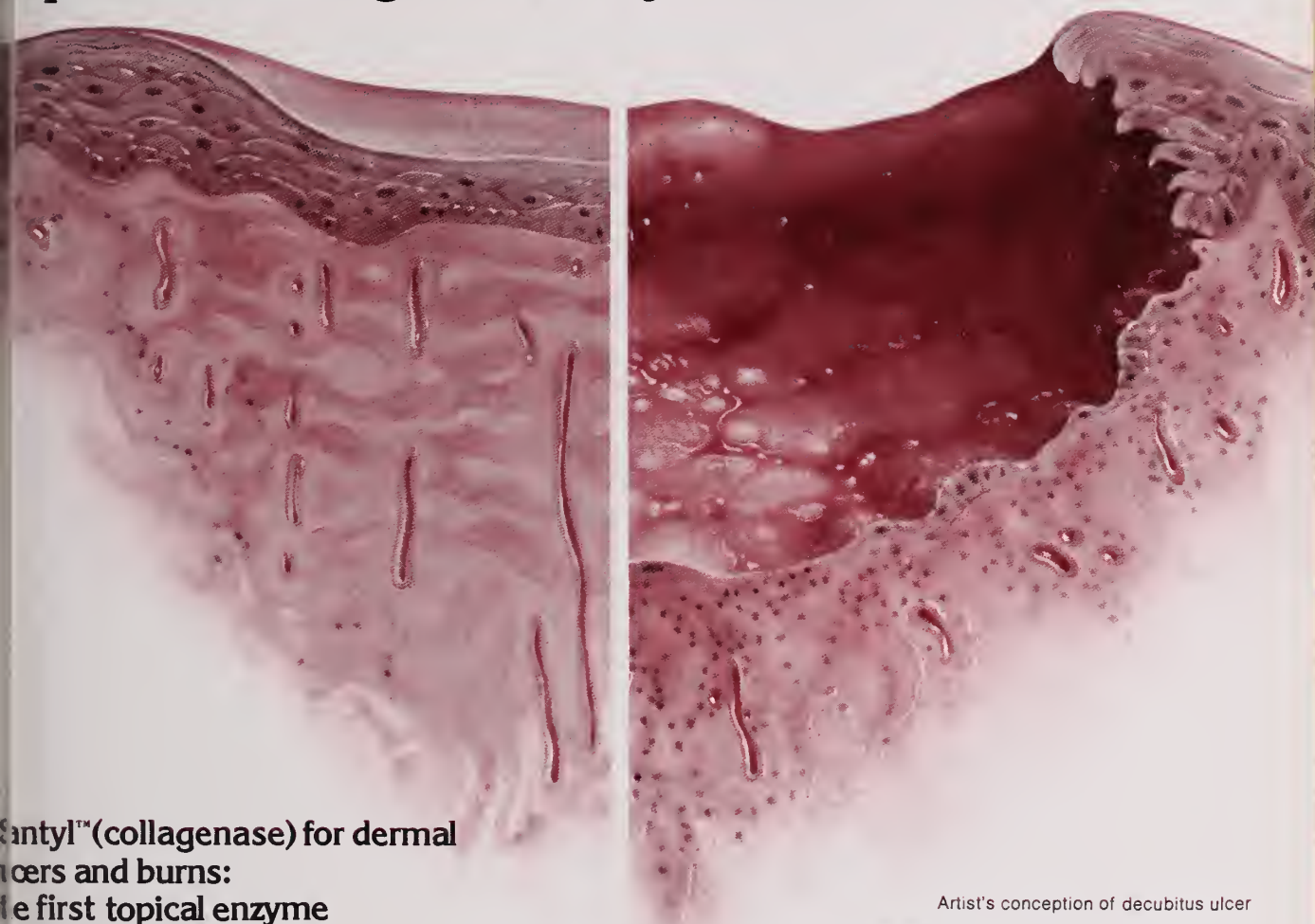
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Varma A O et al: *Surg. Gynec. Obstet.* 136:281, Feb. 1973.

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Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

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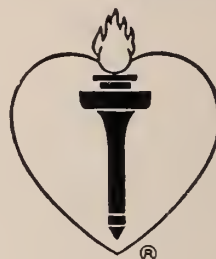


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including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonyleurea, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

Precautions: The following should be accomplished at regular intervals: Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activity requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

Adverse Reactions: This is a potent drug; its misuse can lead to serious results. Review detailed information before beginning therapy. Ulcerative esophagitis, acute and reactivated gastric and duodenal ulcer with perforation and hemorrhage, ulceration and perforation of large bowel, occult G.I. bleeding with anemia, gastritis,

epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, aplastic anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fatal and nonfatal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomatous, aggravation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with over-dosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement. (B)98-146-070-G

Serious side effects do occur. Select patients carefully (particularly the elderly) and follow them closely in line with the drug's precautions, warnings, contraindications and adverse reactions.

For complete details, including dosage, please see full prescribing information.

GEIGY Pharmaceuticals
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Ardley, New York 10502

What should a medication for sleep be expected to provide?



Before prescribing Dalmane (flurazepam HCl), please consult Complete Product Information, a summary of which follows:

Indications: Effective in all types of insomnia characterized by difficulty in falling asleep, frequent nocturnal awakenings and/or early morning awakening; in patients with recurring insomnia or poor sleeping habits; and in acute or chronic medical situations requiring restful sleep. Since insomnia is often transient and intermittent, prolonged administration is generally not necessary or

recommended.

Contraindications: Known hypersensitivity to flurazepam HCl.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. Caution against hazardous occupations requiring complete mental alertness (e.g., operating machinery, driving). Use in women who are or may become pregnant only when potential benefits have been weighed against possible hazards. Not recommended for use in persons under 15 years

of age. Though physical and psychological dependence have not been reported at recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage.

Precautions: In elderly and debilitated patients, initial dosage should be limited to 1 mg to preclude oversedation, dizziness, or ataxia. If combined with other drugs having hypnotic or CNS-depressant effects, consider potential additive effects. Employ usual precautions in patients who are severely depressed, or with

Sleep for 7 to 8 hours without need to repeat dosage during the night

No sleep medication has been as rigorously evaluated in the sleep research laboratory as Dalmane. Insomnia patients given one 30-mg capsule of Dalmane at bedtime, on average: fell asleep within 17 minutes, had fewer nighttime awakenings, spent less time awake after sleep onset, and slept for 7 to 8 hours with no need to repeat dosage during the night.

Sleep with consistency

Dalmane (flurazepam HCl) has been shown to be consistently effective even during consecutive nights of administration. Thus there is little likelihood for the need to increase dosage to maintain therapeutic effect.

Dalmane is in a class by itself. Not a narcotic, barbiturate or methaqualone, Dalmane is the only available benzodiazepine specifically indicated for insomnia.

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Chronic tolerance studies have confirmed the relative safety of Dalmane (flurazepam HCl); no depression of cardiac or respiratory function was noted in patients administered recommended or higher doses for as long as 90 consecutive nights. In most instances when adverse reactions were reported they were mild, infrequent and seldom required discontinuance of therapy. Morning "hang-over" with Dalmane has been relatively infrequent. Dizziness, drowsiness, lightheadedness and the like have been the side effects noted most frequently, particularly in the elderly and debilitated. (An initial dose of Dalmane 15 mg should be prescribed for these patients.)

When your evaluation of insomnia indicates the need for a sleep medication, consider Dalmane—a single entity agent proved effective and relatively safe for relief of insomnia.

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When restful sleep is indicated

One 30-mg capsule h.s.—usual adult dosage
(15 mg may suffice in some patients).

One 15-mg capsule h.s.—initial dosage for elderly or debilitated patients.

ROCHE

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Nutley, New Jersey 07110

Depression or suicidal tendencies. Blood counts and liver and kidney tests are advised during therapy. Observe usual precautions in presence of impaired renal or liver function.

Reactions: Dizziness, drowsiness, lightheadedness, staggering, ataxia may have occurred, particularly in elderly or debilitated patients. Severe drowsiness, lethargy, disorientation and probably indicative of drug intolerance or overdosage, have been reported.

Also reported were headache, heartburn, upset stomach, nausea, vomiting, diarrhea, constipation, GI pain, nervousness, talkativeness, apprehension, irritability, weakness, palpitations, chest pains, body and joint pains and GU complaints. There have also been rare occurrences of sweating, flushes, difficulty in focusing, blurred vision, burning eyes, faintness, hypotension, shortness of breath, pruritus, skin rash, dry mouth, bitter taste, excessive salivation, anorexia, euphoria, depression, slurred speech,

confusion, restlessness, hallucinations, and elevated SGOT, SGPT, total and direct bilirubins and alkaline phosphatase. Paradoxical reactions, e.g., excitement, stimulation and hyperactivity, have also been reported in rare instances.

Dosage: Individualize for maximum beneficial effect. *Adults:* 30 mg usual dosage; 15 mg may suffice in some patients.

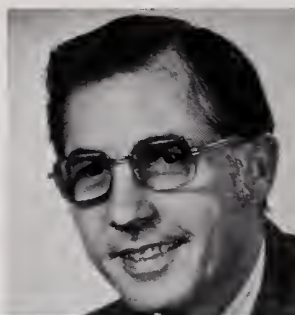
Elderly or debilitated patients: 15 mg initially until response is determined.

Supplied: Capsules containing 15 mg or 30 mg flurazepam HCl.

"Prescription drugs – who should determine the maker?"

Dispenser of Medicine

Clifton J. Latiolais
President
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Pharmaceutical
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Maker of Medicine

C. Joseph Stetler
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Pharmaceutical
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"Too many doctors are indifferent to the economic consequences of their decisions." So stated a recent issue of *Medical News Report* (December 4, 1972), an independent weekly newsletter published by the AMA Chief Executive F. J. L. Blasingame, M.D.

Doctor, are you indifferent...?

In discussing an anticipated increase in Blue Shield rates, Dr. Blasingame's newsletter had this to say:

"In general, it can be said, I have given the impression they are not particularly concerned with the increase in cost of health care to patients..."

"True, an MD's training is primarily scientific, but in the real world of practice, all of his scientific decisions have a price tag, or an economic impact. The economics of health beckon the practitioner's attention. Concern for economics of medicine..."

When the pharmacist recommends that a drug product other than the one ordered be dispensed, the prescriber invariably permits the change when he feels the best interests of the patient will be served.

Shortcomings of Pro-Substitution Argument

The fact remains that it is necessary for the prescriber to know that the change is being contemplated and to be in a position to consent or demur. Without that opportunity for unilateral decision of the pharmacist made in the absence of clinical knowledge of the patient, could expose to needless risks, and in addition jeopardize the relationship between the professions of Pharmacy and Medicine. In my view, there is nothing in the pro-substitution argument that offsets these risks.

The Issue of Drug Knowledge

Substitution advocates claim that the primary justification for changing the rules is the desire to better utilize pharmacists' knowledge about drugs. Yet the pharmacist's task to keep current on the entire field of drug therapy, to some degree puts him at a disadvantage. Most often, a practicing physician will use expert knowledge of no more than 25

be an obligation of medical care...

Medical societies ought to continue campaigns to point out the substantial savings that could be realized thru deductible insurance protection for catastrophic illness. At the very least, they should, in the patients' interest, question the wisdom of any insurance organization that raises health care costs by forcing policyholders to buy insurance they may not need or want and probably won't ever use.

Too many doctors are indifferent to the economic consequences of their decisions. Too many, for example, habitually hospitalize patients for the convenience of the MD. It's no surprise to deny such habits exist... Doctors, thru their medical societies, have unhesitatingly appealed to their patients for support in the fight against government interference in the private practice of medicine. The public in the past has responded. It's time the American Medical Association and state and local medical societies paid off the debt by taking effective action to hold down the cost of medical care."

Cost of Drugs

Insurance rates and hospital charges are only two factors in health

care costs. The cost of drugs—both prescription and nonprescription—is another.

And when it comes to drug costs, the nation's pharmacists are concerned. Through their national professional society, the American Pharmaceutical Association, pharmacists are advising the public to use nonprescription medication cautiously and conservatively, and to seek the advice of their pharmacist before selecting or purchasing such drugs.

Outdated Laws

The pharmacist also is aware that when it comes to prescription drugs, often he has an even greater opportunity to reduce the cost to the patient—with no sacrifice in the quality of the medication dispensed. But in many states, outdated and antiquated laws prevent the pharmacist from engaging in drug product selection. "Drug product selection" simply means that the pharmacist functions in the patient's interest by consciously choosing, from the multiple brands available, a low-cost quality brand of the specific drug to be dispensed in response to the physician's prescription order.

Much *misinformation* has been purposely spread by those who stand to gain financially by maintaining

high drug costs to the public. An endless stream of propaganda has emanated from the drug industry in an effort to persuade the medical profession that these so-called anti-substitution laws should be retained. And as long as these laws are retained, the drug industry will continue its current marketing practices which contribute unnecessarily to high drug costs to patients. These practices also are inviting government agencies to expand their restrictive controls on physicians and pharmacists.

APhA Efforts

As pharmacists, we are concerned about health care costs. We hope that every physician shares our concern on this vital issue, and will give his personal support to the constructive efforts APhA has undertaken in the interest of all patients.

(For a complete discussion of drug product selection, you are invited to request a free copy of the "White Paper on the Pharmacist's Role in Product Selection" from: American Pharmaceutical Association, 2215 Constitution Avenue, N.W., Washington, D.C. 20037.)

Drugs that he selects to treat the variety of conditions encountered in practice. Moreover, the physician's choice of a specific brand is based on his knowledge of the patient's medical history and current condition, and his experiences with a particular manufacturer's product.

Some substitution proponents have argued that the dispensing of a prescription is a simple two-party transaction between the pharmacist and the patient, and that a substituting pharmacist may avoid even a technical breach of contract by simply informing the patient that he is making a substitution. I would judge that the courts would be sympathetic toward a pharmacist who substituted without physician approval and who took a legal defense that seeks to make the patient responsible for the pharmacist's actions.

Reduced Prescription Prices?

Substitution advocates are appealing to the consumer, and particularly the consumer activist, that reduced prescription prices could be achieved by legalization of substitution. I have seen absolutely no evidence to verify this claim. To the contrary, experience in Alberta, Canada, where substitution is authorized, suggests

the opposite.

Many pharmacists understandably are concerned about the cost of maintaining multiple stocks of similar products. While there is no doubt that inventory costs rise when additional brands are stocked, it would be interesting to know how much they rise, and how many pharmacists actually stock *all* brands—of, say, ampicillin or tetracycline—or how long they keep "slow moving" products on their shelves before they are returned for credit. To ask that the industry eliminate multiple sources is to ask competitors to stop competing.

Drug Substitution—A License for the Unethical

Anti-substitution repeal would favor "corner cutting" pharmacists and manufacturers. For them, free substitution would be not a right, but a license. As an aftermath, it is quite likely that the confidence of both physicians and patients in the profession of Pharmacy would be eroded, as revelations about the unconscionable behavior of an undisciplined few were magnified in the press or in professional circles.

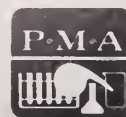
Summary

In short, what the American Pharmaceutical Association advo-

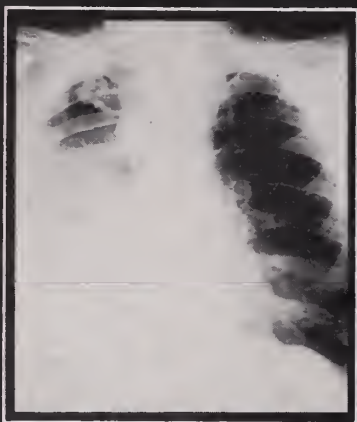
cates as a broad-spectrum panacea looks to us to be not only a minority view (advocacy of substitution is by no means a uniform policy in Pharmacy), but also an extraordinarily costly and ineffective remedy, whose side effects are odious. We believe (1) that an impressive majority of pharmacists prefer to work with Medicine and with industry, for the consumer, and for the general good, (2) that they seek the privilege to substitute when the patient might gain and when the patient's doctor agrees, and (3) that they seek to work for the resolution of genuine grievances openly and professionally.

(For amplification of PMA views, please write for our booklet, "The Medications Physicians Prescribe: Who Shall Determine the Source?" It is available from: Pharmaceutical Manufacturers Association, 1155 Fifteenth Street, N.W., Washington, D.C. 20005.)

Pharmaceutical
Manufacturers Association
1155 Fifteenth Street, N.W.
Washington, D.C. 20005

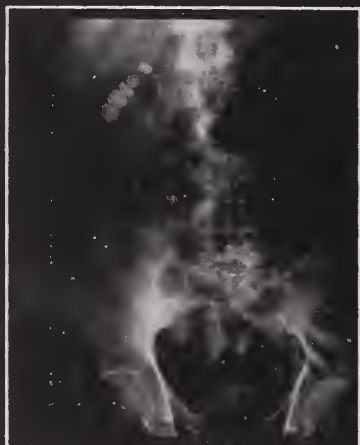


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President's Letter



Epilog

REPRESENTING THE MINNESOTA State Medical Association has been a wonderful experience. The frustrations, anger and fatigue that I spoke of in my first letter are still present. The problems of PSRO, unionism, national health insurance, continuing medical education, HMO's splintering of organized medicine have not been resolved, but all are more than counterbalanced by the people I have encountered.

One who cried when the magnolia blossoms froze during a late snow storm, some who laughed because it was good to have life again, staff who worked for you and me at Minnesota State Medical Association headquarters for many more than the stated forty hour week, I remember them all.

Colleagues who carried much of my work load, patients who understood and tolerated my absences, officers, councilors, committee members, editors, authors,* all devoting countless hours to medicine, and respondents to the President's Letter, all had something in common. They cared and they shared it.

My family who supported my efforts and our extended family, all of whom gathered in person or in spirit at a time of personal loss, they cared and they shared.

So this letter too is dedicated to people, all those whose lives touched mine in this past year. Many of them I don't know. We touched through print or by word of mouth and not in person, but they are there, they are real, and it was a wonder filled year.

George B. Martin

President
Minnesota State Medical Association

*[Many of those mentioned in this paragraph would appreciate the opportunity to respond to George Martin's epilog of thanks. I think I can speak for everyone who has worked with him in his great year as President of the Minnesota State Medical Association, who would like to tell him that he has earned our total admiration and respect. We too are part of his extended family. Ed.]



The President's Committee
on Employment of the Handicapped
Washington, D.C. 20210

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The National Center for Voluntary Action



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Indications: Santyl Ointment is indicated for debriding dermal ulcers and severely burned areas. In other types of necrotic skin lesions reports on the use of Santyl Ointment have been limited to clinical observations without controls.

Contraindications: Application is contraindicated in patients who have shown local or systemic hypersensitivity to Collagenase.

Precautions: The enzyme's optimal pH range is 7 to 8. Lower pH conditions have a definite adverse effect on the enzyme's activity, and appropriate precautions should be taken.

The enzymatic activity is also adversely affected by detergents and hexachlorophene and heavy metal ions such as mercury and silver which are used in some antiseptics. When it is suspected such materials have been used, the site should be carefully cleansed by repeated washings with normal saline before Santyl Ointment is applied. Soaks containing metal ions or acidic solutions such as Burow's solution should be avoided because of the metal ion and low pH. Cleansing materials such as hydrogen peroxide or Dakin's solution do not interfere with the activity of the enzyme. Debilitated patients should be closely monitored for systemic bacterial infections because of the theoretical possibility that debriding enzymes may increase the risk of bacteremia.

The ointment should be confined to the area of the lesion in order to avoid the risk of irritation or maceration of normal skin.

A slight erythema has been noted occasionally in the surrounding tissue particularly when the enzyme ointment was not confined to the lesion. This can be readily controlled by protecting the healthy skin with a material such as Lassar's paste.

Since the enzyme is a protein, sensitization may develop with prolonged use although none has been observed to date.

Adverse Reactions: Adverse reactions to Collagenase have not been noted when used as directed.

Dosage & Administration: Santyl Ointment should be applied once daily (or once every other day in the case of outpatients) in the following manner.

(1) Prior to application the lesions should be gently cleansed with a gauze pad saturated in normal saline, buffer (pH 7.0-7.5) or hydrogen peroxide to remove any film and digested material.

(2) Whenever infection is present, as evidenced by positive cultures, pus, inflammation or odor, it is desirable to use an appropriate topical antibacterial agent. Neomycin-Bacitracin-Polymyxin B (Neosporin) has been found compatible with Santyl Ointment. This antibiotic should be applied to the lesion in powder form or solution prior to the application of Santyl Ointment. Should the infection not respond, therapy with Santyl Ointment should be discontinued until remission of the infection.

(3) Santyl Ointment should be applied (using a wooden tongue depressor or spatula) directly to deep wounds, or, when dealing with shallow wounds, to a sterile gauze pad which is then applied to wound. The wound is covered with sterile gauze pad and secured with clear tape or Kling bandage.

(4) Crosshatching thick eschar with a #11 blade is helpful. It is also desirable to remove as much loosened detritus as can be done readily with forceps and scissors.

(5) All excess ointment should be removed each time dressing is changed.

(6) Use of the ointment should be terminated when sufficient debridement of necrotic tissue has taken place.

Overdose: Action of the enzyme may be stopped, should this be desired, by the application of Burow's solution U.S.P. (pH 3.6-4.4) to the lesion.

How Supplied: Santyl Ointment contains 250 units of Collagenase enzyme per gram of white petrolatum U.S.P. The potency assay of Collagenase is based on the digestion of undenatured collagen (from bovine Achilles tendon) at pH 7.2 and 37° C. for 24 hours. The number of peptides cleaved are measured by reaction with ninhydrin. Peptides released by a trypsin digestion control are subtracted. One net Collagenase unit will solubilize ninhydrin reactive material equivalent to 4 micromoles of Leucine.



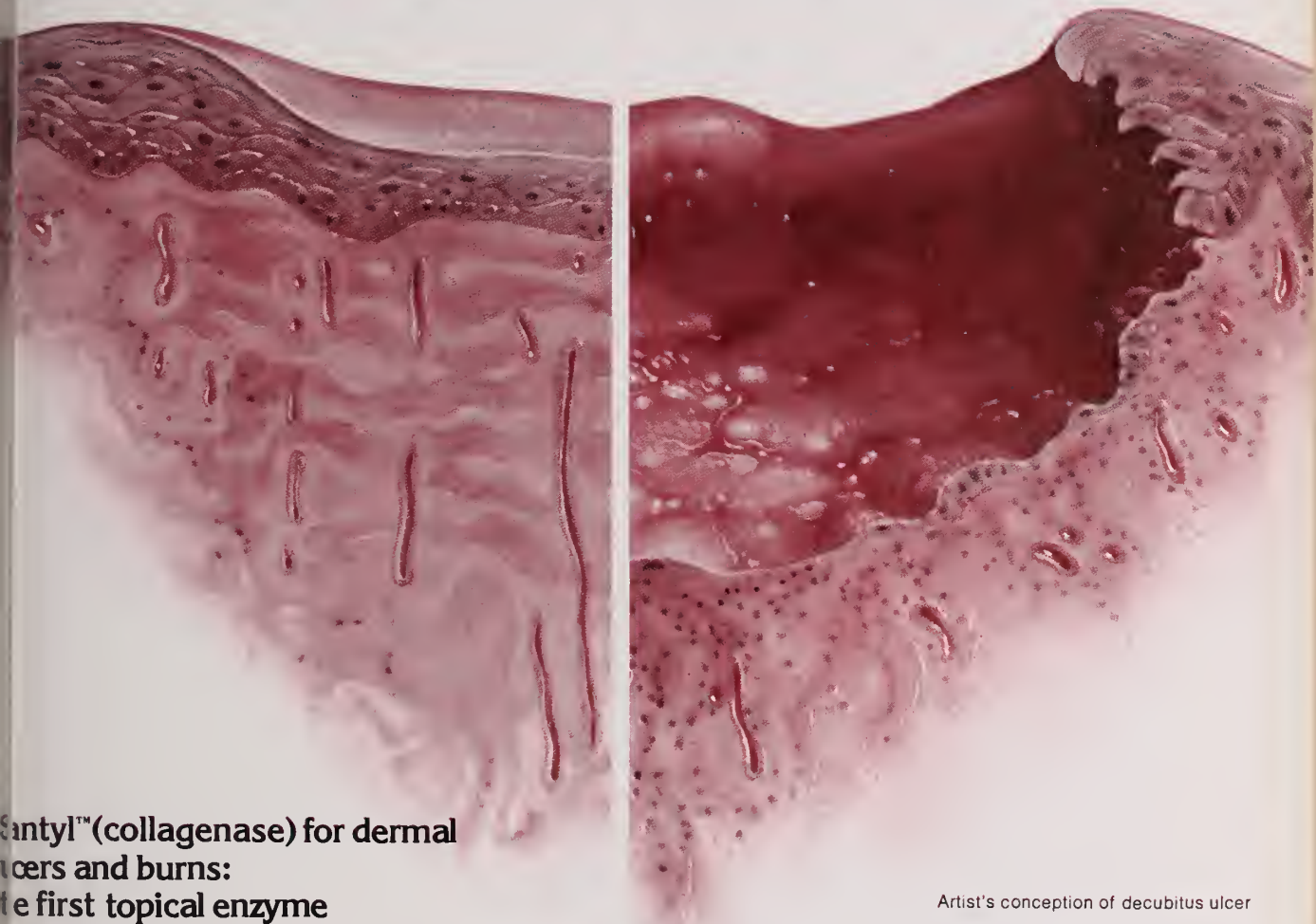
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Klippel-Feil Syndrome

EDWARD McELFRESH, M.D.* and ROBERT WINTER, M.D.†

THE KLIPPEL-FEIL SYNDROME is referred to as "brevicollis," "congenital cervical fusion" or "cervical assimilation" in the English literature. The Germans refer to it as *Kurtzhals* ("short-neck") while the French literature uses *le homme sans cou* ("the man without a neck").

Congenital cervical vertebral fusion was described in an Egyptian mummy from about 500 B.C.³⁸ There is also a report of the fusion of the cervical vertebrae and ribs in an ancient Paucarancha Indian of Peru.²⁵ Realdus Columbus, the successor to Vesalius at Padua, described in 1559, a case of occipito-atlantal fusion.⁶ Haller in 1743 described a case of congenital cervical fusion.¹⁸ Three years later, Morgagni presented two cases and mentioned others.²⁸ In 1850, Rokitsky described a 70-year-old tailor with a C2-7 fusion together with spinal deformities.³² There were numerous case reports between 1850 and 1912.

In 1912, Maurice Klippel and Andre Feil published a complete study of a case of a 46-year-old tailor who died of pneumonia and nephritis and described the signs of the syndrome. They reported the case in four publications that year.^{20,21,22,23}

Meisenbach reported the first American case in 1913.²⁷ In 1919, Feil reviewed the literature in a classic thesis.¹⁰ Bertolotti, a year later, described the triad of short neck, limitation of motion and low hairline.⁴ Dubreuil-Chambardel was the first to use the eponym of Klippel-Feil Syndrome.⁸

Embryogenesis and Etiology

The work of Strecker³⁹ shows that at 21 days of fetal life the first pair of occipital somites forms which then progresses distally. By the 27th day, cervical segments are being laid down and are finally completed by the 37th day. Soon after a

group of mesenchymal cells in each somite migrate toward the notochord, forming a sclerotome. The rostral half of each sclerotome fuses with the caudal portion of the adjacent sclerotome to form a vertebra.

If the lateral halves of the centrum do not fuse, anterior spina bifida or cleft vertebral body occurs and hemivertebrae are formed. Closure of the neural arches does not take place until much later. If the neural tube and skin have not separated, posterior meningocele or myelomeningocele is the result.

With chondrification of the vertebrae, the centra elongate at the expense of the intervertebral material and finally fuse or very nearly fuse in the region of the notochord to form an almost solid cartilaginous column during the eighth week. Normally this fusion is transitory, but if subsequent development of the disc fails to take place, or if presumptive disc tissue chondrifies and fuses with the vertebral body, the vertebrae remain solidly joined throughout life. Congenital vertebral fusion may be considered to date from the eighth week of intra-uterine life although Hadley¹⁷ claims that the defect occurs during the first month.

There have been various factors postulated as the cause of Klippel-Feil syndrome. Degenhardt and Kladetsky⁷ produced vertebral anomalies of the dorsal spine including "fusion" of vertebral bodies in 34% of rabbits whose mothers were subjected to decreased oxygen between the ninth and 11th days of gestation which corresponds to the 25th day of human gestation. Some people have suggested prenatal insult or disease such as radiation or infection, particularly in Turner's syndrome^{3,35} and the male phenotype of Turner's syndrome.^{19,26} Gray¹⁴ even postulated that all cases of Klippel-Feil syndrome are due to a chromosomal aberration similar to but not identical to Turner's syndrome. There is a definite trend for the Klippel-Feil syndrome to run in families, especially those with isolated fusion of two cervical vertebral bodies. Gardner¹¹ has tried to associate

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Klippel-Feil syndrome with myelomeningocele and diastematomyelia as another form of the neural tube failing to close.

None of the theories completely explains the failure of vertebral segmentation.

Incidence, Classification and Material

The incidence of Klippel-Feil syndrome is reported to vary from 1:42,000 births²⁴ to 3:700 births.³⁶ The literature varies as to sex difference but most authorities feel there is equal sex involvement. Gray's review of the world literature showed that females tended to be seen at an earlier age and had more severe involvement. In the Gillette Hospital series there were eighteen males and twenty-eight females.

In his 1919 thesis, Feil classified Klippel-Feil syndrome in three types which we have chosen to follow in reviewing our cases. *Type I* is the classic type of cervical and upper thoracic vertebral block fusion and other vertebral defects. *Type II* is an isolated fusion of two cervical vertebrae. This is the most common type but usually causes no symptoms and is detected usually on a routine roentgenogram. *Type III* is either Type I or II associated with either lower thoracic or lumbar vertebral involvement. The Type III has been further divided into subgroups I or II depending upon involvement of the cervical spine. Gundersen and associates¹⁵ have shown that the most common type of isolated cervical fusion, C2-3, is an autosomal dominant lesion while C5-6 fusion is autosomal recessive.

Of the 46 cases in our series, 25 were Type I while there was only one Type II fusion. There were 20 Type III lesions with 16 showing a Type I cervical lesion and four showing a Type II cervical fusion. Isolated Type II lesions are unlikely to be seen at a hospital for crippled children since no deformities or disability is produced.

Pregnancy and Delivery

There were 31 normal pregnancies and deliveries in the Gillette series. Two births were premature; nine had prolonged difficult labor. Three of these were instrument deliveries and one birth was a breech delivery. There was one Cesarean section, and two babies born with the cord wrapped around the neck. The birth histories of two were unknown.

Associated problems included an appendectomy in a mother during the seventh week of pregnancy with a number of Xrays being performed at the

time. Two mothers had influenza during the first trimester of pregnancy. One patient had a twin stillborn with a cranial myelomeningocele. This could be used in support of Gardner's theory that Klippel-Feil syndrome is part of the spectrum of the neural tube failing to close.

Diagnosis

The *diagnostic triad* is: (a) a short-neck, (b) low hairline and (c) limitation of motion. In the literature, slightly over 50% of patients exhibit the triad. In the Gillette series, 18 patients had the triad while 16 had a short-neck and motion limitation but not a low hairline. Three patients had two characteristics but had no limitation of motion while one patient did not have a short-neck. Seven patients had either a short neck or limitation of motion only. One patient exhibited none of the characteristics of the triad.

The diagnosis of Klippel-Feil syndrome depends upon Xray of the whole spine. A-P, lateral and oblique views are needed. The A-P view is often obstructed by the mandible or the low occiput. Also helpful may be an open-mouth view and tomograms.

In addition to the vertebral body fusion, the Xrays should be examined for spina bifida which Gjorup and Gjorup¹³ say is the most common lesion besides the block fusion. Cleft vertebral bodies, hemivertebrae, widened neural canal, atlanto-occipital fusion, deformed dens, platybasia, and the occiput riding on the posterior upper thorax are other defects that may appear.

Thirty-eight of the 46 patients had a spina bifida and 20 patients exhibited a cleft in a vertebral body. All 20 of the patients with a cleft vertebral body had a spina bifida although not always at the same level. Fourteen had cervical hemivertebrae and there were 27 with thoracic hemivertebrae. Six of these had hemivertebrae in both the cervical and thoracic regions.

A deformed odontoid was found in 18 (two of these were absence of the dens). An atlanto-occipital fusion was found in 22 patients. In 14 instances both atlanto-occipital fusion and deformed dens were found to be coexistent. Platybasia was found in 11 cases.

Associated Deformities

Sprengel's deformity was found in 15 patients. There were three bilateral cases, three involving the right side, and nine involving the left side. The literature¹⁴ reports about a 25% incidence of

prengel's deformity with Klippel-Feil syndrome. There were three instances of omovertebral bones. Operations performed included three Schrock procedures, three Woodward procedures, two Green procedures and plastic repair of the scapulae in a bilateral case.

Assymetry of the head was found 15 times and facial assymetry 20 times. In nine instances, both characteristics were present together. Platycephaly and brachycephaly were the most common cranial deformities.

There was one patient with hydrocephalus and the possible diagnosis of iniencephaly. Gilmour¹² felt that Klippel-Feil syndrome is a mild variation of iniencephaly.

Eye abnormalities included five patients with squints, four with ptosis, two with third nerve palsy, three with sixth nerve palsy, and one with nystagmus.

Seven patients had ear abnormalities, usually being low set ears although one patient had preauricular tag. A hearing deficit was found in seven patients, usually a conductive hearing loss.

Cleft palate was found in six patients only one of which had a cleft lip. Defects associated with a cleft lip are usually inherited while those with only a cleft palate are developmental in origin.³³ There was one patient with a cleft uvula, a variant of cleft palate. There were eight instances of a high arched palate.

Rib abnormalities included eleven instances of fused ribs, ten with absent rib and nine cervical ribs. Chest defects included three cases of pectus excavatum, four cases of pectus carinatum, and one case with a Harrison groove.

Thirteen patients exhibited a torticollis either of a muscular or bony origin. Pterygium colli or webbed neck was found in eleven instances. Additional pterygia were found in four cases and were as follows:

1. Axillary
2. Axillary, elbows, hips, knees, and first web spaces
3. Axillary, elbows, and right knee
4. Axillary, hands, and knees

Chromosomal studies done on two patients were within normal limits while another is being studied as a possible male phenotype of Turner's syndrome.

Scoliosis greater than 20 degrees was found in 29 of the 46 patients. Of the Type I cases, five were greater than 40° and were usually associated with hemivertebrae. Sixteen of the Type III cases

were greater than 40°. The greatest curve was found in a girl with thoracic unsegmented bars on opposite sides with a normal vertebra between. She went from 92° when first seen to 135° nine years later.

Neurological lesions included six cases of arm weakness and four cases of hyperreflexia of the lower extremities. The only recorded case of mirror movements associated with Klippel-Feil syndrome was seen in a girl at Gillette Hospital in 1924 which is six years before the first report in the literature by Bauman.² This girl was two years old before she could sit by herself or crawl. Mirror movements have recently become the focus of neurological study in Klippel-Feil syndrome.^{1,16} There were isolated instances of a present Babinski and clonus. One patient exhibited symbiotic autism. Cervical root lesions present since birth were found in two patients, one of which exhibited a Horner's syndrome, absent sweating of half the body, and winging of the scapula. Serious neurological deficits usually do not appear before the twenties and, therefore, were not prevalent in this series. Patients with Klippel-Feil syndrome are reported to have an increased susceptibility to cervical fractures and fracture-dislocations with minimal trauma.³⁷

Cardiac abnormalities in this series included a case of surgically repaired patent ductus arteriosus, two cases of dextrocardia, and two systolic murmurs which were never properly evaluated. Cardiac abnormalities were emphasized by Nora and associates.³⁰ Intestinal problems included an isolated tracheo-esophageal fistula, situs inversus, and bowel obstruction requiring surgical intervention.

Intravenous pyelograms were performed 14 times and were abnormal in six including two patients with agenesis of a kidney, two ectopic kidneys and two crossed renal ectopia. Recently two other cases of renal agenesis have been reported.³¹

Of the 18 males, the status of the genitalia was recorded in 16. There were six cases of undescended testes. Two of the females had been shown to have an absent or vestigial vagina and uterus.

Defects of the hands included two cases of radial club hands with absent thumbs, a hypoplastic thumb, a patient with familial clinodactyly of the fifth fingers, and vestigial nubbins with the patient with probable male Turner's syndrome.

Two patients developed tumors, a chondrosarcoma requiring hip disarticulation, and a giant

cell tumor of a tendon sheath of the extensor tendon of the left index finger.

Treatment

The treatment of scoliosis of the Type I lesions included seven patients treated with Milwaukee bracing. The three patients with a curvature less than 20 degrees who were treated with a Milwaukee brace were started before the age of one year. There were three fusions performed in the Type I lesion and were basically of the upper thoracic area. The history of one of these patients does not make note as to the level of fusion.

The Type III (I) lesion was treated in two patients with a Milwaukee brace. Fusions were performed eight times and included the cervical spine two times. The Type III (II) lesions were fused in the thoracic and lumbar spine in three of the four cases with the other patient being treated with a Milwaukee brace since his family refused spinal fusion.

Most reports in the literature indicate conservative treatment in Klippel-Feil syndrome is of no value and only serves to increase the misery of life already made unpleasant by the deformity. The Milwaukee brace is useful for thoracic scoliosis. A Schanz collar has been recommended by Russe.³⁴ Physiotherapy is of no value.

Surgical procedures described in the literature^{5,14,29,40} for the Klippel-Feil syndrome include suboccipital craniotomy and cervical laminectomy, cervical laminectomy, spinal fusion, removal of cervical and upper three thoracic ribs with trimming of the trapezius muscle, resection of the outer portion of the trapezius muscle, and plastic repair of pterygium colli.

Surgery in Klippel-Feil syndrome is of value to improve function, appearance and to limit progressive neurologic complaints.

Contraindications to surgery are a poor surgical risk generally, an asymptomatic person who has adjusted reasonably well, and a patient with a surgically incorrectable neural anomaly in addition to a bony defect.

Two patients have had operative procedures other than spinal fusion performed for Klippel-Feil syndrome at Gillette Hospital. One patient had plastic surgery repair of her pterygium colli following correction of her bilateral Sprengel's deformity. Cosmetically she obtained an excellent result and was quite pleased with the improvement of her physical appearance.

The other patient was a twelve year old girl with a markedly shortened neck with an extreme webbing. The hairline extended down onto the thorax. The shoulders were elevated and rotated forward about 50 degrees with shortened malformed clavicles. She could flex and extend her neck only 15 degrees with no rotation present. She also had a bilateral sixth nerve palsy and axillary webbing. Xrays showed congenital absence of the odontoid, platybasia, cervical fusion, cervical ribs, and the occiput almost reaching the thoracic spine. A Milwaukee brace with outriggers was used in an attempt to hold the shoulders in good position but was of no real help. The surgical procedure included a v-shaped incision over the shoulder with a medial base. The trapezius muscle was freed from the clavicle, acromion, and scapular spine. The clavicle was dissected free subperiosteally and the outer two-thirds resected. The acromion was also excised. The subcutaneous tissue and skin were closed in a y-plasty, removing the webbed appearance of the skin of the neck. Later the same procedure was performed on the opposite side. Postoperatively she had essentially the same flexion-extension of the neck but had obtained a small amount of rotary motion. The shoulders were still held in a forward position but not as much as preoperatively. She was again placed in a Milwaukee brace with outriggers but a few months later she refused to wear it. Follow-up two years later showed prominence of the medial, non-resected portions of the clavicles which were excised. Follow-up four years after the original surgery showed excellent improvement of the levels of the shoulders, but increased forward rotation of the scapula. An interscapular fascial sling operation was refused.

Discussion

Does the Klippel-Feil Syndrome deserve to stand alone as a specific entity? The tendency to lump together patients who have as their sole item of common interest a congenital failure of segmentation of cervical vertebrae stretches the term "syndrome." The original description of a patient with a short neck, low hairline, decreased cervical motion and failure of segmentation of cervical vertebrae does indeed constitute a useful grouping of symptoms and a recognizable entity.

Type II lesions, the isolated "fusion" of two vertebrae with no deformity, no symptoms, and essentially no pathology should not be included

in the Klippel-Feil Syndrome. Type III lesions with vertebral anomalies in other areas of the spine and coincidental cervical lesions is intermediate in justification for inclusion in the Klippel-Feil. Congenital failure of segmentation is just as common in other areas of the spine and has not earned the eponym.

This review highlights the great frequency of associated anomalies, from skeletal, such as congenital absent radius, to cardiac, and genitourinary. The physician confronted with a patient with the Klippel-Feil syndrome is obligated to investigate other organ systems, especially the genitourinary.

A recent review at Gillette Hospital of routine intravenous pyelography in 88 patients with congenital anomalies of the spine (myelomeningocele excluded) has revealed a 28% incidence of anomalous genitourinary tracts, several having obstructive uropathy.

Audiologic deficits might easily be missed unless one realizes the high incidence of hearing loss in the Klippel-Feil Syndrome. It is this "triggering" of interest in other organ systems that is a prime dividend of recognizing this syndrome.

Summary

Forty-six cases of the Klippel-Feil Syndrome, none previously reported, were reviewed at the Gillette Children's Hospital, St. Paul, Minnesota. Both the clinical and radiologic features were reviewed in detail. The large number of associated anomalies is of particular interest. Sprengel's deformity was noted in 15, cranial asymmetry in 15, ocular abnormalities in 15, ear deformity in seven, hearing deficit in seven, cleft palate in six, and cleft lip in one.

Eleven had fusion of ribs, 10 had absent ribs, nine had cervical ribs, eight had chest deformity, 13 had torticollis, 11 had webbed neck, 29 had scoliosis greater than 20 degrees, 11 had neurologic deficits, five had congenital cardiac defects, six had abnormal intravenous pyelograms, six had undescended testes, and two had absence of the vagina and uterus.

Surgical treatment of the cervical deformity was seldom attempted but an occasional case may benefit from correction of web neck, correction of elevation of the scapulae, and correction and fusion of scoliosis deformity.

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Femoral Neck Fractures

Analysis of Hip Prosthetic Replacements

Hennepin County General Hospital

RICHARD H. MOORE, M.D.,* ROBERT F. PREMER, M.D.† and RAMON B. GUSTILO, M.D.‡

AVIABLE, UNITED FEMORAL head is the ideal result following a fracture of the femoral neck, but this often is not achieved. Prosthetic replacement, rather than internal fixation, is indicated in selected patients. The aim of the operation is to produce a stable, relatively painless hip, suitable for early weight bearing that will serve the patient for the remainder of his life. The selection of the proper patients for treatment with a prosthesis is still a problem and remains controversial. The relative indications often given for the use of a femoral head prosthesis in patients with normal acetabula are:

1. Irreducible fractures
2. Fracture dislocations
3. Elderly patients physiologically 70 years or older whose activity is already significantly limited by age or disease
4. Patients who could not reasonably be expected to tolerate a second operation
5. Parkinson's disease
6. Pathologic fracture
7. Fractures that have "fallen apart" i.e. following unsuccessful nailing, nail penetration, non-unions, avascular necrosis, etc.
8. Primary idiopathic avascular necrosis including kidney transplant patients

For the last twenty years, after the initial decision was made for primary or secondary prosthetic replacement, intermedullary prosthesis such as the Austin Moore, Minneapolis or Thompson Prosthesis have been the most widely accepted. Recently, cementing in a femoral prosthesis or doing a total hip replacement has been advocated as another alternative. The latter is a more extensive procedure in that both the femoral and acetabular components are implanted. Is the more extensive procedure justified? At this time there is no data with long term follow-up on patients treated for

femoral neck fractures with total hip arthroplasty.

It has been our impression that prosthetic head replacement for the treatment of femoral neck fractures has been very satisfactory. In an attempt to corroborate this we reviewed the literature and our cases at Hennepin County General Hospital from 1962 to 1971.

The Operating Room Log was reviewed and 184 prosthetic replacements were found in this ten year period. The charts of only 172 hips in 166 patients could be located (Table 1). There were six patients with bilateral prostheses. There were 153 Austin Moore's (Figure 2) and 19 Minneapolis prosthesis (Figure 2) in 122 females and 50



Fig. 1—A displaced femoral neck fracture in a 78-year-old woman.

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Fig. 2—(Left) a short stem Austin-Moore prosthesis. (Middle) a long stem Austin-Moore prosthesis which currently is used whenever feasible. (Right) a Minneapolis prosthesis which has not been used since 1965 at Hennepin County Hospital.



Fig. 3—A properly seated, well fitting Austin-Moore prosthesis.

males. The average age of the entire groups was 75.6 years. Of these, there were 144 prostheses for acute fractures (103 females and 41 males) with an average age of 78 years (Table 2). The average hospital stay was 29 days and the time from fracture to surgery was 3.7 days.

TABLE 1	
Femoral Head Prosthetic Replacement Reviewed at Hennepin County General Hospital between 1962 and 1971	
172 Hips in 166 Patients	
122 Females	
50 Males	
Average Age 75.6	
1962-1971	

TABLE 2	
144 Prostheses in Acute Fractures	
103 Females	41 Males
Average Age	78 Years
Average Hospital Stay	29 Days
Fracture to Surgery	3.7 Days

There were 28 prostheses as secondary treatment for femoral neck fractures (i.e. following non-union, avascular necrosis, penetrated nails, etc.) (Table 3). In this group there were 19 females and nine males with an average age of 63.2 years and an average of 16 months from fracture to prosthesis. Their average hospital stay was 39.6 days.

TABLE 3	
28 Secondary Prostheses	
19 Females	9 Males
Average Age	63.2 Years
Average Hospital Stay	39.6 Days
Fracture to Surgery	16 Months

We were able to examine 41 hips in 36 patients with an average follow-up of 41.6 months. Adequate information was obtained on another twelve patients by telephone contact. In 18 other patients, there was sufficient information from the old charts to be included with an average follow-up of 12.5 months. There were 66 patients known to have died as of July, 1972.

Indications for a prosthesis has varied somewhat through the years, but in general, prostheses have been used in patients who were 75 years old or older, or had irreducible fractures and in patients where there was a delay of more than 24 hours between the time of fracture and when they went to surgery. In many of our patients, the initial condition on admission was such that they were considered too great a surgical risk, so their surgery was postponed until they were medically stable. In acute fractures, the delay between fracture and surgery was almost four days (3.7).

Complications

There were 22 [in hospital] deaths (12.8%) which were all in the acute fracture group (Table 4). In addition, there were another 14 patients known to have died within six months of surgery or a total of 36 patients (20.3%) in the entire series. Their average age was 81 years. Of those deaths directly related to surgery, seven died of complication from wound infection, seven from pneumonia, four from pulmonary emboli, two from myocardial infarcts, one from a stroke and one from serum hepatitis. There were 36 inpatient non-fatal complications (20.9%) and nine late complications. In the entire series there were 16 infections or 9%. Ten of these were deep infections (5.2%). Seven of the 10 patients with deep infections died during their hospitalization.

TABLE 4

In Hospital Fatal Complications following Femoral Head Prosthesis. It Should be Noted that all of the Fatal Complications Occurred in the Acute Fracture Group

Deaths = 22 (12.8%)

All in Acute Fracture Group

Average Age 81

Infection & Septicemia	7
Pneumonia	7
Pulmonary Emboli	4
Myocardial Infarction	2
CVA	1
Serum Hepatitis	1

There were three dislocations, one resulting in the removal of the prosthetic head. Other non-fatal inpatient complications are listed in Table 5.

TABLE 5

In Hospital Non-Fatal Complications

Deep Infection	3
Superficial Infection	6
Dislocations	3
Femur Fracture	1
Pulmonary Emboli	1
Pneumonia	9
Thrombophlebitis	3
Peroneal Palsy	2
CVA's	2
DT's	2
UGI Bleeds	2
Fat Emboli	1
Bowel Obstruction	1
Kanamycin Induced Deafness	1

36

Non-fatal complication rate 20.9%.

There were nine late complications (Table 6). There were four patients who had fractures below their prosthesis from two to five years after prosthetic placement. There were four additional prosthesis removed, one for late dislocation and only three for painful prosthesis. Two of these patients received their prosthesis for avascular necro-

sis following fracture. There was one case of painful protrusion of the prosthesis into the acetabulum.

TABLE 6

Late Complications

Fractures Below Prosthesis	4
Painful Prosthesis Leading to Removal	3
Late Dislocation Leading to Removal	1
Painful Protrusion	1

Results and Discussion

In assessing the results we modified the Merle D'Aubigne method⁸ in grading the parameters of pain, motion, and function (Table 7).

TABLE 7

Analysis of Prosthesis

I. Pain

Poor —	0—Intense & Permanent
	1—Severe Pain at Rest
	2—Severe Pain with Ambulation; Prevents Activity
Fair —	3—Tolerable Pain with Limited Activity
	4—Mild with Walking—None at Rest
Good —	5—Mild & Unconstant—No Limitation of Activity
	6—No Pain

II. Range of Motion

Poor —	0—Ankylosis with Malposition
	1—No Movement with None or Slight Deformity
	2—Flex Less than 40 Degrees
Fair —	3—Flex 40 to 60 Degrees
	4—Flex 60 to 80 Degrees; can Reach Foot
	5—Flex 80 to 90 Degrees; Abduction 15
Good —	6—Flex Greater than 90 Degrees; Abduction 30

III. Function

Poor —	0—Cannot Walk
	1—Can Walk Only with the Aid of Crutches or Walker
	2—Can Walk Only with the Aid of a Cane
Fair —	3—Without Cane for Less than One Hour, Hard to Walk without Cane
	4—Extended Walk with Cane; Short Walks without Cane & with Limp
Good —	5—Slight Limp with Cane
	6—Normal

In the acute fracture group with an average follow-up of 40 months, 80% had little or no pain, 87% had a good range of motion and 25% were able to walk well without a cane.

In the secondary prosthesis group that had an average follow-up of 46 months; 84% had little or no pain, 87% had a good range of motion and 25% were able to walk without a cane. Overall, 81.5% were termed "good" in grading for pain, 77.5% "good" for range of motion and 25% "good" for *function* or walking ability (Table 10).

The results are somewhat misleading in that we find only 25% had what were defined as good *functional* results. In assessing the results we must keep in mind that the average age was nearly 80 at the time of follow-up. We must also keep in mind what we had hoped to accomplish by this procedure, i.e. a relatively painless, stable hip. Considering this then, well over 80% had a satisfactory results. An 80-year-old patient who has a painless hip, an adequate range of motion but requires a walker for balance should be considered a satisfactory result even though in using our system he would fit the "poor" group under *function*.

In 1964, Hinchey and Day⁵ reported their series of 294 fresh fractures treated with femoral head prosthesis. They found that overall, 84% of these had satisfactory results with a one to eight year follow-up and those that were followed for over four years had a 90% satisfactory result. Furthermore, they did not find any tendency for deterioration of the results between four and eight years. Anderson¹ (1964) reported 84% good results in 33 fresh (acute) fractures which were followed an average of 40.5 months. Lunceford⁶ (1965) had good or excellent results in 89% of 37 patients. Hinchey and Day⁵ reported in their 37 patients that had *poor* results, 29 of these poor

results could be attributed to pre-existing medical diseases and only in nine due to hip pain.

Similarly, in our patients, the poor functional results were due almost invariably to medical problems and senility and not to hip pain. It should be noted, that a majority of our patients that we could locate and were available for examination, were patients in nursing homes. This may be a factor in biasing our results toward poorer function. The one patient who was seen in clinic and had significant pain, also had had a stroke and could not ambulate because of this and did not wish any further treatment. Our mortality rate of 12.8% in the immediate postoperative period and wound infection rate of 9% is higher than we would expect with hip pinning. For the last few years, we have treated intracapsular fractures as semi-emergencies and have tried to fix them with a Massie nail within the first 24 hours, regardless of the patient's age. The Austin Moore prosthesis was used for acute fractures that cannot be adequately reduced or that are more than 48 hours old and in patients with Parkinson's disease.

Whenever possible we use the Austin Moore prosthesis with the long stem (Figures 2 and 4). We feel that this newer design gives more stability. We approach the hip using either Moore's low posterior incision (Southern Exposure)⁹ or Marcy's⁷ modification of the Gibson posterior lateral incision. We have noted that a good appearance of the prosthesis on Xray, generally means a good result (Figure 3). The prosthesis should be well seated on the medial cortex. The femoral

TABLE 8
Acute Fractures

	Good	Fair	Poor	Unknown	Per Cent
Pain	36	8	1	4	80% (36/45)
Range of Motion	25	5	4	15	74% (25/34)
Function	11	6	27	5	25% (11/44)

TABLE 9
Secondary Prosthesis

	Good	Fair	Poor	Unknown	Per Cent
Pain	16	3	0	2	84% (16/19)
Range of Motion	13	2	0	6	87% (13/15)
Function	4	6	6	5	25% (4/16)

TABLE 10
Composite Results of Acute Fractures & Secondary Prosthesis
Treated with Femoral Prosthesis

	Good	Fair	Poor	Unknown	Per Cent
Pain	52	11	1	6	81.5% (52/64)
Range of Motion	38	7	4	21	77.5% (38/49)
Function	15	12	33	10	25% (15/60)

neck should be cut to the proper length. The top of the prosthetic head should not be more than $\frac{1}{2}$ " above the greater trochanter. The prosthetic head must accurately and concentrically fit the acetabulum.

Conclusions

Over 80% of the patients achieved a satisfactory result using prosthetic femoral head replacements for femoral neck fractures. This figure is comparable to other reports in the literature.^{1,5,6,9} We feel that the results of treatment with the Austin Moore prosthesis are satisfactory and do *not* justify the use of total hip replacement or even to cementing in a femoral prosthesis in a routine acute femoral neck fracture when the acetabulum is normal. We can only speculate that since the total hip replacement is a more extensive (and expensive) surgical procedure, that the complication rate would likely increase in this type of patient and that the long term results would not be significantly improved.

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Fig. 4—A long-stem Austin-Moore prosthesis.

He that's born today and dies tomorrow,
 Loseth some days of mirth, but months of sorrow.
 Why fear we death that cures our sicknesses?
 Author of rest and end of all distresses?
 Other misfortunes often come to grieve us;
 Death strikes but once, and that stroke doth relieve us.*

*Thomas Ford: Not Full Twelve Years, 1607.

The Sugartong Splint

in Humeral Shaft Fractures

THOMAS H. COMFORT, M.D.*

THIS PAPER REPORTS a new treatment of humeral shaft fractures being used at Saint Paul-Ramsey Hospital in the unconscious patient or the patient with multiple-injuries. The sugartong splint held with adherent foam to the arm, and used as a long splint to control the angulation, with special regard to the angulation apex lateral at the fracture site, is an efficient and relatively simple method of treatment which has given good results. Half of the patients had an injury to the chest, abdomen, head or other extremity which required bedrest. Traction, while satisfactory for maintaining the alignment of humeral shaft fractures, undesirably restricts positioning and remobilizing injured patients. Traction requires constant attention in patients who are unconscious, irrational or overactive. Even co-operative patients develop distraction with this treatment. A variant is to apply a hanging cast with traction while the patient is lying down. This allows the patient to sit up intermittently or to rest flat in bed. The arm must be repositioned at each move.

The standard treatment of humeral shaft fractures in the 1930's was a spica type cast, or a humeral abduction frame. Both of these are difficult to apply, often requiring general anesthesia, and difficult to maintain in position, with immobilization of the joint above and below the fracture. Excessive motion of the cast on the body is transmitted to the fracture site causing both an increase in healing time (average: over ten weeks) and frequent non union. The muscles of the shoulder, elbow and hand could not be easily exercised, and stiffness was a problem in older patients. Boehler suggested a smaller spica cast which held the arm abducted slightly, and allowed some motion at the elbow, hand and wrist, and reported more satisfactory union rates.

Caldwell advocated the hanging cast treatment in 1933, and reported a series of fractures treated in 1940 with a sharp decrease in the incidence of non union. He found that the hanging cast was preferable for almost all types of humeral shaft fractures, providing that it was a light cast, that the arm was held dependent, that the elbow was flexed 90°, that the sling was properly fixed at the wrist, that weekly roentgenograms were taken to correct angulation, that active exercises of the muscles of the shoulder, fingers and thumb were continued, and that traction was continued on the cast if the patient was in bed.

Watson-Jones and Boehler both advocated a plaster sugartong type splint going down the inner aspect of the arm around the elbow and up the lateral aspect of the arm. Both commented, however, that in shaft fractures, there was a tendency toward angulation apex lateral, and it was necessary to use a padding or abduction splint in order to hold the distal fragment out from the body, and the collar and cuff suspension at the wrist to allow slight traction from the unsupported elbow. Here again a very close supervision of the patient is required in order to accurately maintain the distal fragment in relationship to the upper fragment of the humerus avoiding distraction, excessive motion, or angulation.

The usual problem in humeral shaft fractures is that the upper fragment, if it includes the attachment of the deltoid muscle, tends to be held in slight abduction because the deltoid muscle is far stronger than the muscles at the shoulder joint which tend to adduct the humerus, while the lower segment tends to adopt a position close to the support of the body. If a splint could be made long enough so that three points of pressure could be developed, one pressing the lower fragment out laterally from the body, a higher force pressing the upper fragment in medially, and the torque of these correcting forces resisted by continuing the

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Fig. 1—4" x 3/16" adherent foam, applied to arm, double thickness at the elbow.



Fig. 2—Molding the plaster, 10 thickness 3½" x 30".



Fig. 3—The completed splint, plaster adhering to the foam.



Fig. 4—Elastic bandage and collar and cuff suspension leaving the shoulder free.

splint over the shoulder area, then alignment could be controlled by the splint alone. If this apparatus can be made light enough so the distracting forces are not developed as in the shoulder spica cast, it would be reasonable to assume that union rate equivalent to that of the hanging cast could be realized. The problem is how to comfortably apply a splint, incorporating the deltoid area.

We have attempted to achieve this goal by using an adherent type of padding under the plaster layer. This is a polyurethane foam which has an adherent surface yet it is not irritating to the skin. The adhesive is distributed in a particulate form so that a solid occlusive film is not developed. The foam is an open pore structure allowing air and moisture to pass through it. It can be obtained in 3/16th or 5/8th inch thicknesses. Usually, we use a single thickness of 3/16th inch on the inner and outer aspect of the arm, and a double thickness over the bony prominences at the elbow. A plaster splint of ten thicknesses is applied over the foam and fastened in place with a temporarily applied elastic shoulder spica bandage. This causes the plaster to penetrate the pores of the foam sufficiently so that it is adherent to the foam. While the plaster is setting, the arm must be carefully molded creating the pressure point on the lateral aspect of the upper fragment, at the same time holding the distal fragment in an abducted position. The properly applied splint has a shallow U-shaped outer contour in its distal two-thirds, and extends over the upper aspect of the shoulder. Fractures of the distal third of the humerus need not have the extension over the shoulder. After the plaster has set, the elastic wrapping is replaced. With the second wrapping, the tension can be reduced and the wrapping need not pass across the shoulder under the opposite arm. The splint will allow slight motions of the shoulder which should be encouraged during the healing phase; a collar and cuff controls motion of the elbow, usually held at 90° of flexion. In fractures of the distal third of the humerus, it is occasionally necessary to add a posterior splint to control the anterior-posterior relationships at the fracture site. If the patient is ambulatory and co-operative, a hanging cast may be preferable to sugartong splints in distal fracture, and some patients are transferred for this reason into a hanging cast after initial splinting of the fracture with a

sugartong cast. In general, we found sugartong treatment alone was satisfactory in 30 of 38 patients. In eight patients a hanging cast, plates, Velpeau bandage, traction and posterior splints were also used.

The fractures were transverse in 19 patients, spiral oblique in 13, comminuted in four and segmental in two. Of the patients, 21 were males, 13 had right sided fractures, and 19 of the 38 had associated injuries.

We found, then, that the hanging cast was not indicated in a large number of these 38 patients for the following reasons: Bedrest was necessary in 19. Nineteen had transverse fractures, three were unconscious, two had acromioclavicular separation of clavicular fractures. Two had brachial plexus injuries that would allow subluxation of the humeral head with traction.

Twenty-eight of thirty patients were healed with less than 15° of angulation. The average healing time was 7.6 weeks and varied from four to 12 weeks except for one actual and one potential non-union. One was a 66-year-old patient with a comminuted fracture who probably would have healed with either a sugartong splint or a hanging cast. She had a fracture of the patella, and of the mandible which demanded bed rest, and therefore was more easily treated with a sugartong splint. The splint was removed eight weeks after the fracture before firm consolidation had occurred in this unusually comminuted injury. The patient was a vigorous person who tended to wave her arm about testing to see if it was working when seen one month after the removal of the sugartong splint. Accordingly, it was elected to apply a long plate and bone grafting, rather than to continue attempts at closed treatment. The other patient was a 27-year-old male who was tried initially in a sugartong splint, and poor alignment was seen. A re-application of the splint was not attempted. The patient was transferred to a hanging cast, and again had poor alignment with distraction. The initial fracture had been an open wound from a high speed automobile injury. It was considered that the distraction was due to extensive soft tissue damage at the fracture site, and that even if the fragments could be held in close proximity, that delayed union was likely. Accordingly, he was admitted to the hospital 17 days after the injury for internal fixation of the fracture site.

Recurrent Hemangioma of the Hand

Associated with A Digital Arteriovenous Malformation

JAMES H. HOUSE, M.D., M.S.*

HEMANGIOMATA ARE FAIRLY common neoplasms but only occasionally occur in the hand. Stack in a study of 300 consecutive tumors of the hand noted only six hemangiomas.⁴ This tumor may be present at birth and regress spontaneously but occasionally will continue to enlarge so as to interfere with hand function. In rare cases a hemangioma may become pulsatile by acquiring communications with an artery and may assume the characteristics of an arteriovenous aneurysm extending over large areas.³

The capillary hemangioma involving the skin needs little attention, but can be treated with coagulation, freezing, radiation or surgical excision if location and size warrant treatment.¹ Hemangiomas may develop deep ramifications into the soft tissues of the hand and have been observed to invade tendons and bones resulting in functional impairment and necessitating radical excision to avoid recurrence.⁵

Case Report

A patient was noted to have a congenital hemangioma on the ulnar aspect of the right middle finger at the time of her birth. At the age of 15 years surgical excision of the mass was attempted at another hospital. Radiation therapy was administered approximately six months later when recurrence was noted. During the next two years the patient noted a progressive increase in size of the lesion and became aware of pulsation present in the finger and in the veins on the dorsum of her hand. When referred for further evaluation, the involved middle finger was noted to be one centimeter longer than the middle finger of the left hand and was 1.2 centimeters greater in circumference (Figure 1). There was a cutaneous birthmark measuring approximately eight by 30 millimeters on the ulnar aspect of the finger with a well-healed mid-lateral scar (Figure 2). The mass was soft and pulsatile and could be substantially decreased in volume by sustained compression. Pulsations were visible in the dorsal veins and a bruit could be heard over the mass with a stethoscope. The digital Allen test demonstrated that the primary arterial supply was by way of

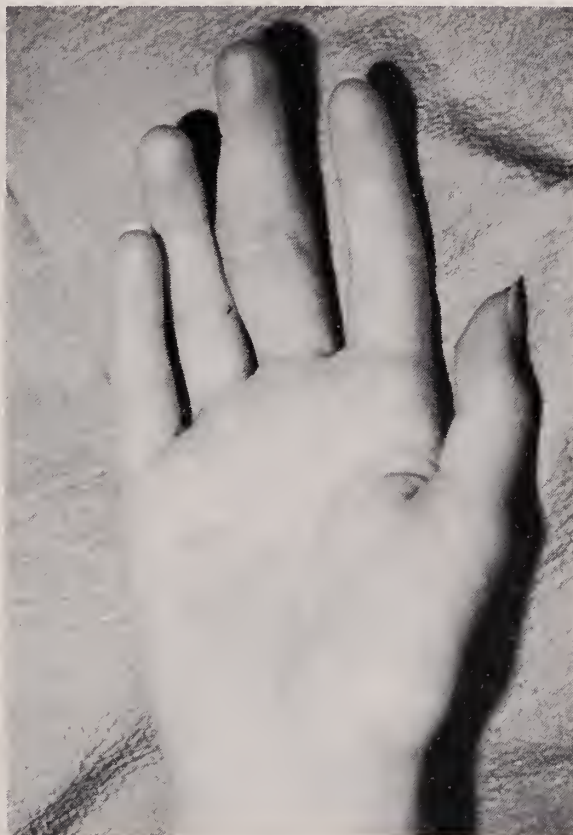


Figure 1



Figure 2

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Figure 3



Figure 4

the ulnar digital artery though the lesion did fill from the radial digital artery as well.

A transfemoral brachial arteriogram was performed which demonstrated an extremely active arterial blood flow to the right middle finger (Figure 3). There was very early dorsal venous filling through a large arteriovenous anastomosis in the lesion with relatively delayed filling of the smaller arteries to the remaining fingers.

Operation

An enbloc excision of the lesion was undertaken removing an ellipse of skin with the underlying hemangioma, ulnar digital artery and two large communicating dorsal digital veins (Figure 4). The volar digital nerve was carefully dissected free and preserved. Multiple communicating arteries and veins from the radial side of the finger were controlled by individual ligation and cautery. The specimen measured two by four by seven-tenths centimeters and was histologically a hemangioma with many large thick-walled vessels consistent with the clinically observed arteriovenous communication.

Discussion

The large arteriovenous communication demonstrated in this lesion may represent a progressive development of the lesion but probably is a result of the previous subtotal resection with the development of an arteriovenous fistula as the lesion recurred. The increase in skeletal length resulting from the increased blood flow that had occurred during her active growing years was not deemed to be sufficient to warrant surgical treatment. Normal sensory function was maintained in the digital nerve distribution and the surgical excision substantially reduced the circumference of the finger. The patient was pleased with the cosmetic and functional results of surgery.

Summary

Vascular neoplasms of the hand can occasionally enlarge or invade structures of the hand resulting in functional impairment. Angiography is a useful tool in evaluating the extent of the lesion and facilitates surgical excision by demonstrating the primary vessels involved in arterial supply and venous drainage.

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When divine souls appear, men are compelled by their own self-respect to distinguish them.—Emerson.

Diabetic Foot Problems

Pathogenesis

WILLIAM J. KANE, M.D., Ph.D.*

"In Britain, at least, more hospital beds are occupied by patients with bad feet than all the other complications of diabetes put together."—Malins¹

GANGRENE OF THE FOOT is 50 to 70 times more common in diabetics over 40 than in the age-equivalent, nondiabetic population.² Between a third and a half of the amputations performed in this country are due to diabetic lesions of the lower extremities. The factors which lead to diabetic gangrene are multiple. Fortunately some of them can be corrected if they are recognized and managed promptly.

But, if these factors are unchecked, gangrene may be inevitable.

Ischemia is the major factor, but others are: neuropathy, reduced resistance to infection, and altered skin pressure relationships. There are other factors which are incompletely understood—such as diminished capillary diffusion and capillary bed sludging.

Ischemia is the insufficient flow of blood to tissue which in turn leads to changes in the function and morphology. The normal blood flow to muscle under resting conditions in man is five ml/min—100 gm of tissue, to cortical bone -1, to skin -9, and to nerve -6.³ Venous occlusion plethysmography shows no difference in resting flow values between diabetics and nondiabetics, but it's obvious that even ordinary functions such as walking can cause a marked increase in the metabolic requirements of tissues. The human basal metabolic rate is about 18 cal/min-Kg. Walking nearly doubles that rate to 33 cal/min-Kg. Most of that increased energy expenditure is in the lower extremities and muscle blood flow values in the leg become five to ten times more than the resting level. It is at this point that lower extremity tissue oxygen needs exceed their supply and irreversible changes occur. Inflammation and

infection inflict the same increased (excessive) demands on the vascular network.

Causes of Vascular Insufficiency

What are the causes of this vascular insufficiency? Are the lesions of diabetes the same as those of arteriosclerosis? One way to visualize the vascular pathologic changes of diabetes is to recognize that diabetics can have two types of vascular disease in their extremities. They can have the typical atheromatous disease which is characterized by a diminishing severity of the vascular lesions as the arteries diminish in size. The iliac and femoral arteries show the most advanced stages, the popliteal and tibial less, and the dorsalis pedis and digital vessels only very little sclerosis. There is splitting and fraying of the internal elastic membrane, mucopolysaccharides are deposited, lipids accumulate, plaques are formed, and the media calcifies. Microscopically, the arteriosclerotic lesion in the diabetic is indistinguishable in major arteries from the lesion in the nondiabetic. Although it seems the lesion develops in more diabetics whose disease has persisted for ten years than in the age-adjusted nondiabetics.^{5,6} In the diabetic population there is no sex difference at any age as contrasted with the male predominance at earlier ages in the general population.¹

The treatment of peripheral arterial disease in diabetics is no different than in nondiabetics, once the roles of neuropathy and infection have been determined to be playing in producing "diabetic gangrene." Diabetes itself is not a contraindication to arterial surgery, either endarterectomy or by-pass graft, no matter how long the patient has been diabetic or how severe the diabetes is.

The second obliterative vascular lesion in dia-

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betics is in some dispute and is called "diabetic microangiopathy." Some investigators have claimed that it is a distinct entity affecting mainly the capillaries but sometimes extending into the arterioles and venules in a patchy distribution.⁷ Characteristically, there is a glycoprotein precipitated in the capillary basement membrane and a proliferation of the endothelial cells. The current evidence that microangiopathy precedes the appearance of carbohydrate dysfunction is as one author states, "so persuasive that redefinition of diabetes has been proposed to include microangiopathy as an integral component of the disease, if not its primary expression,"⁸ and that the vascular disease may be "genetically determined, antedating, and independent of, the overt metabolic disturbances."⁹ It may be "that the disease of the small pancreatic vessels precedes and is responsible for interference with islet cell function."^{10,11} These changes have been well documented for the tissues of the diabetic leg.^{7,12}

Later studies have shown basement membrane thickening and endothelial cell enlargement and proliferation in other areas such as the dermis of the finger¹³ and the forearm,¹⁴ and in muscle.^{15,16} These changes are present before the onset of clinical diabetes and some clinicians advocate the use of biopsies to facilitate the earlier diagnosis of diabetes in patients who have a strong family history of diabetes.¹⁷

Siperstein has shown that the average muscle capillary basement membrane width in normal subjects is approximately 1080 Å. By contrast, the basement membrane width in a series of 40 diabetic patients was 2278 Å. In the same work Siperstein showed an 8% incidence of capillary basement membrane thickening in normal subjects, but 98% in the diabetic groups and 53% incidence in a genetically prediabetic group.¹⁷

There seems to be little doubt that with increasing duration of diabetes the basement membrane becomes thickened in the vast majority of diabetic patients. As the basement membrane thickens and infolds, it projects into the endothelial cell cytoplasm causing formation of paraaminosalicylic acid (PAS) + material. What the PAS + material does to capillary function is unknown though some maintain it interferes with the normal capillary diffusion of nutrients and/or insulin, preventing normal metabolism in the cells. This correlates with the elevated insulin-like activity reported in prediabetes and early overt diabetes. Later, exhaustion of the beta cells and atrophy of

the islets lead to manifest carbohydrate intolerance.

The longer diabetes exists, the worse the angiopathy can become. Effective diabetic control does not prevent the vascular lesions but good control can diminish the incidence of angiopathy.¹ In addition to the structural changes of the vascular system, it has been found that during various stages of diabetes the whole blood and plasma viscosity is increased. Simultaneously, there is a tendency toward increased intravascular cell aggregation. These changes in blood and plasma viscosity and the aggregation phenomenon all play a part in a vicious cycle that impairs blood flow. Together with diminished resistance to infection, abnormal plantar pressure relationships, and peripheral neuropathy conditions arise in the diabetic foot which frequently end in amputation.

Neuropathy is common in diabetics but the problem is so diverse in its manifestations and so little has been determined about its etiology that confusion has been great.

Since the criteria for diagnosis of neuropathy vary considerably from clinic to clinic, the incidence varies all the way from 0.1% in Joslin's 1928¹⁹ survey to 93% in Collens' ²⁰ series of 1940 which was based on impairment of vibration sense. It is obvious that the harder one looks for these changes the more likely will they be found. The presence of chronic neuropathy can be ascertained by diminished ankle jerks or diminished vibration sense in the feet. Rackow found in a survey of 3500 diabetic patients that if patients over 70 years of age were excluded the incidence of absent ankle jerks is 21% and absent vibration sense 8%.²¹ Others find rates as high as 25 to 45%. Mayne's 1965 series is a careful comparison of normal and diabetic age-matched groups and reports the incidence twice as high in the diabetic group.²² Since there is a steady increase in the incidence of neuropathy in both groups with advancing age, Mayne concludes that the neuropathy of aging, as shown by impaired ankle jerks and loss of vibration sense at the ankle, is a degenerative process and probably ischemic. Neuropathy with severe pain, muscle weakness, and extensive sensory disturbance is truly diabetic.

The relationship of the neuropathies to the severity and duration of the diabetes, the age of the patient, or with other complications of diabetes is not clear. Neuropathy may occur during good

diabetic control but may also be seen with glyco-
uria. It may be precipitated by stress situations.²¹

TABLE 1

A Chronology of Diabetic Vascular Disease

1964	Marchal	Gangrene of foot increased in diabetics
1936	Kimmelstiel & Wilson	Diabetic glomerulosclerosis
1941	Allen	Glomerulosclerosis due to changes in basement membranes of glomerular capillaries.
1941	Dry and Hines	Occlusive dis. of diabetics 30 x normal legs—asccribed to arteriosclerosis.
1943	Ballantyne & Loewenstein	Retinal "hemorrhages" really microaneurysms of capillaries.
1948	Friedenwald	Postulated similar changes in capillaries of other organs.
1952	Bell	Diffuse capillary changes noted.
1953	Megibow	Postulated occlusive peripheral angiopathy.
1954	Lundback	Coined term "diabetic microangiopathy" for syndrome affecting legs, eyes, kidneys, and heart.
1959	Fagerberg	PAS + thickening of vasa nervorum.
1959	Goldenberg	PAS + thickening of vessels of skin, muscle, nerves.

Diabetic Neuropathy

Diabetic neuropathy is typically gradual in onset and chronic in character but it is possible that the onset be acute. In such instances muscular weakness and wasting are more common. Sensory manifestations predominate in the chronic form. Diabetic neuropathy may be classified under the following headings: (1) Chronic, or sensory neuropathy, (2) Subacute neuropathy which may be predominantly sensory or predominantly motor, (3) Autonomic neuropathy, and (4) Single nerve lesions.²¹

Chronic

Chronic sensory neuropathy, the commonest type of neuropathy, is frequently manifested only by absent ankle jerks, and less commonly by diminished vibration sense. The findings are distal, symmetrical, sensory, and confined to the lower limb. A burning or aching, persistent pain may be found together with muscle tenderness. It is worse at night. The onset does not usually follow periods of bad control and recovery is rarely complete.

In severe long-standing chronic neuropathy, there may be trophic changes confined to the feet and ankle which are probably due to sensory denervation particularly loss of appreciation of pain. These are similar to those found in other chronic sensory denervating conditions such as tabes, eprosy and syringomyelia. Ulcerations may appear acutely but more commonly follow the formation of a blister, trauma, or some sort of pressure from the shoe. Deformity of the toes decreases the

space available in the shoe and so increases the pressure and rubbing of the metatarsal heads.²³ Consequently, neuropathic ulcers are common on the foot and across the transverse arch on its plantar surface over the head of the first metatarsal often in association with the hallux valgus. Neuropathy of long duration also produces changes in joints, especially the mid-tarsal joint. These changes may progress to total disorganization and the production of Charcot-like joints, with swollen, deformed, hypermobile, and usually painless feet. Superficial ulceration is common and Xrays may reveal an unsuspected osteomyelitis.

Subacute

Subacute neuropathy with a major sensory component is less common and usually appears after a period of diabetic neglect or bad control or at the onset of severe diabetes. It is usually reversible. Lightning-like pain, tenderness, and paresthesiae are characteristically present. The signs tend to be symmetrical, although less so than in chronic neuropathy, and may appear in one limb before the other. Knee and/or ankle jerks may be lost and all forms of sensation may be impaired.

Subacute neuropathy with predominant motor findings of weakness and wasting of the muscles, with or without pain, also usually follow periods of bad diabetic control. The commonest presentation is with pain in one thigh which is worse at night and may be relieved by walking. It is often followed by weakness and wasting of the quadriceps. The knee jerk is usually absent but the ankle jerk may be preserved.

Autonomic

Autonomic neuropathy is the third type seen, and the manifestations which can be demonstrated most commonly are sweating, edema, changes in skin texture, impotence, diarrhea, and atony of the bladder.

Single Nerve

Single nerve lesions which may be found in the upper as well as in the lower extremities may present with acute pain followed by severe wasting of the muscles. The lesion is probably due to local injury of a nerve producing reduced conduction time and increased susceptibility to damage. The progression of a carpal tunnel syndrome in a diabetic patient is frequently more rapid and more permanent than in a nondiabetic. Nerve conduction abnormalities have been found in nearly all diabetics, with or without symptoms. It has been postulated that this tendency of diabetics to develop neuropathies causes peripheral

nerves to be susceptible to trauma and pressure and that the isolated neuropathies especially those affecting the upper limbs are due to pressures, stretchings, and compressions which less commonly produce similar lesions in the nondiabetic.

The pathology of the neuropathies is still obscure. The chief structural abnormality is severe segmental demyelination with relative preservation of axon cylinders. This is regarded as evidence that the primary disorder may be in the Schwann cells rather than in the neuron itself.^{24,25} The cause of diabetic neuropathy is unknown but various factors have been incriminated, including atherosclerosis of the vasa nervorum,²⁶ diabetic microangiopathy of the vasa nervorum with glycoprotein deposition,⁷ and other biochemical factors.

Another factor which frequently leads to foot problems in the diabetic is related to the abnormal pressure relationships between the plantar surface of the foot and stiff shoe gear. Retraction of the toes from neuropathy throws weight on the metatarsal heads, and a callus forms. Ulceration often follows attempts to remove it. This is the so-called perforating ulcer. Barrett and Mooney in a recent presentation postulated that the deformity is more responsible for the subsequent diabetic ulcer than is anesthesia.²³ Among the evidence available to support this hypothesis is the fact that transmetatarsal amputations in diabetics, by eliminating the pressure areas, are relatively successful, certainly more successful than in the nondiabetic population with distal, localized gangrene.^{28,29,30}

The methods of Brand³¹ and Harris,²³ have also shown; in a semiquantitative manner, the tremendous pressures that can be localized to one or more sites due to the deformities.

Diabetic neuropathy may also produce weakness of the intrinsic muscles of the foot resulting in impaired control of movement of the toes. The lumbrical palsy results in loss of extension at the proximal interphalangeal joints while the interosseus palsy greatly diminishes the power of metatarsophalangeal flexion. The normal but unbalanced pull of the long flexor and extensor muscles helped by shoe pressure produces crumpled, clawed toes with a strong tendency to dorsal subluxation of the metatarsophalangeal joints.

Summary

The lesions of the lower extremities of diabetics can all be related ultimately to the problems of

ischemia—the large vessel disease is quite similar to the same disease seen in nondiabetics and the small vessel disease is characteristic, perhaps even pathognomonic, of diabetes, affecting mainly capillaries, including both the vasa vasorum of the large vessels and the vasa nervorum. The latter lesion affects the autonomic nerves, the sensory

TABLE 2
A Chronology of Diabetic Neuropathy

1790+	Hope	Nocturnal burning sensation in feet (Edinburgh)
1790+	Clegg	Impotence (Glasgow)
1798	Rollo	Sciatica, muscle weakness
1849	Bernard	Diabetes due to CNS lesion
1864	Marchal	Sciatica, peripheral anesthesia due not to CNS lesion but to diabetes.
1883	Bouchardat	Peripheral night pain and paresthesiae
1885	Pavy	Sweating disorders
1890	Auché	Perforating ulcer and cranial nerve palsy
1897	Williamson	Absent knee jerk.
1936	Jordan	Reviewed descriptions and prognosis and considered arteriosclerosis the cause.
1945	Rundles	Gastrointestinal symptoms
1959	Fagerberg	PAS + thickening of vasa nervorum.

TABLE 3
Suggestions for the Care of Diabetic Feet

1. Wash feet each night with face soap and warm water.
2. Dry feet with a clean, soft rag without rubbing the skin. Dry carefully between the toes.
3. Always keep your feet warm. Use woolen socks or wool-lined shoes in the winter and white cotton socks in warm weather. Use a clean pair of socks each day.
4. Use loose-fitting bed socks.
5. Never apply hot water bottles, electric pads, or any other form of mechanical heating device to your extremities.
6. Wear properly fitting shoes and be particularly careful that they are not too tight. Use shoes made of soft leather with nonrigid shanks.
7. Cut your toenails in a very good light and only after your feet have been soaked in warm water and cleansed thoroughly. Cut the toenails straight across. Do not cut down in the corners of the nails. If your vision is impaired do not attempt to cut your toenails. Seek assistance from others.
8. Do not cut your corns or calluses. Instead, take pressure of shoe off corns, bunions, or calluses by using soft, peripheral pads or larger shoes.
9. Do not wear circular garters.
10. Do not use strong antiseptic drugs on your feet, particularly tincture of iodine, lysol, or carbolic acid.
11. Seek medical care at the first signs of a blister infection of the toes, ingrowing toenails, or trouble with bunions, corns, or calluses.
12. Do not use tobacco in any form.
13. Have some member of your family examine your feet at least once a week for blisters, sores, or other wounds.
14. Avoid getting athlete's foot. If present, be very careful how you treat it. Seek your physician's advice on the matter.

erves, and the motor nerves. Autonomic nerve changes cause altered vascular function; sensory nerve changes cause anesthesia, and motor nerve changes cause paresis and muscle imbalance. Ultimately, all three types of nerve lesions combine to create the typical cutaneous, subcutaneous and osseous lesions of diabetic feet. Undoubtedly, the same small vessel changes diminish the region's

resistance to infection as well.

Because no effective treatment exists for the primary angiopathic lesion, all present efforts must be directed at better management of the diabetic and better prophylaxis against the secondary lesions. Suggestions for the patient are listed in Table 3.

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For from the heele (as say the best Phisitions) to the preuie partes there passe certaine veines and slender synnewes, as also the like come from the head, and are carryed lyke little pypes behind the eares: so that (as sayth Hippocrates) yf those veynes there be cut a sonder, the partie straighte becommeth cold and vnfruiteful. Which reason our Poete wel weighing, maketh this shepheards boye of purpose to be wounded by Loue in the heele.*

*"E.K." gloss to Edmund Spenser: The Shepheardes Calendar, March, 1579.

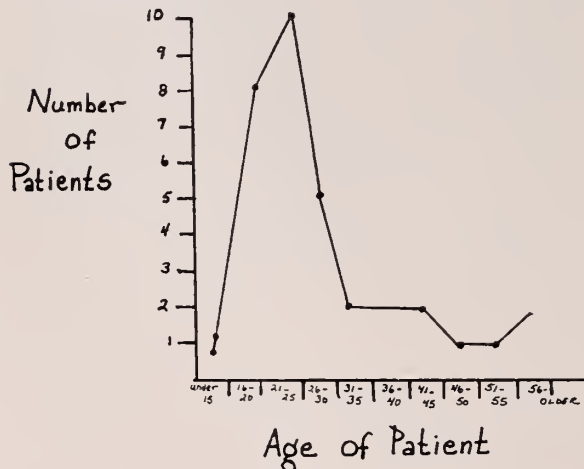
Acute Ligamentous Injuries of the Knee Joint

Treated by Surgery

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ORTHOPAEDIC SURGEONS in this country generally agree that immediate diagnosis and primary surgical repair of severe knee ligament injuries produce the optimum return of knee function.³ This report describes various knee ligament ruptures and types of surgical repair, and confirms the efficacy of immediate diagnosis and repair.

We have treated 36 knees in 34 patients at Hennepin County General Hospital in the past ten years. Males accounted for 24 of the 36 knees. Injuries affected right and left knees about equally. Although their ages ranged from 14 to 65 years, those under 30 years constituted 70% of the series (Figure).



Figure

A car striking a pedestrian produced the most frequent causes of injury. Others commonly resulted from falls or motorcycle accidents and athletic mishaps (Table 1). In most cases we could not ascertain the actual mechanism of injury.

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TABLE 1
Etiology of Injury

NON-SPORTS (24)	SPORTS (12)
9—Pedestrian accidents	5—Football
7—Fall from height	4—Skiing
5—Motorcycle accident	2—Baseball
1—Automobile accident	1—Wrestling
1—Boating accident	
1—Not known	

Correct Diagnosis

Often difficult to make, the complete diagnosis depends on a careful and early examination. Because swelling, tenderness, and pain develop rapidly, the immediate post-injury period provides the best opportunity. After aspirating the knee and injecting ten to 20cc of two percent xylocaine, test for collateral and cruciate instability. If the physician does not see the patient within the first hour, spinal or general anesthesia may be necessary to overcome pain, spasm, and guarding. In many of our patients, the surgical findings demonstrated the incompleteness of the clinical diagnosis, attesting to the difficulty of evaluating these injuries. The medial meniscus and posterior cruciate especially evaded accurate evaluation.

Fractures occurred in 39% of the cases, most commonly being avulsions secondary to collateral ligament or anterior cruciate strains.

Stress Xrays may assist in confirmation of collateral ligament rupture. Of the valgus injuries receiving stress Xrays, the medial joint line opened an average of 13.5mm. All of these demonstrated at least 10mm of widening on the Xray.

Types of Injury

Valgus with external rotation produced the majority of injuries (Table 2). Eighty-six percent included disruption of the medial collateral ligament. The "unhappy triad," described in 1950 by Dr. O'Donoghue,³ consists of disruption of the

medial collateral ligament, anterior cruciate, and medial meniscus. Twenty-three percent of the medial injuries had this finding at surgery. The anterior cruciate was disrupted in 21 of 31 medial injuries.

TABLE 2
Type of Injury—36 Knees

Injury to:

Structures of the medial side (31) (86%)

8—Medial collateral ligament

10—Medial collateral ligament & anterior cruciate

7—Medial collateral ligament, anterior cruciate and medial meniscus

1—Medial collateral ligament and medial meniscus

1—Anterior cruciate and medial meniscus

2—Medial collateral ligament, both cruciate ligaments and medial meniscus

1—Medial collateral ligament, both cruciate ligaments and both medial menisci

1—Medial collateral, posterior cruciate and medial meniscus

Structures of the lateral side (3) (8.3%)

1—Lateral collateral ligament

1—Lateral collateral ligaments and medial meniscus

1—Lateral collateral ligaments, both cruciates and both menisci

Structures on both sides (2) (5.7%)

1—Both collateral ligaments and anterior cruciate

1—Both collateral ligaments, anterior cruciate and medial meniscus

Cruciate ligaments only (0) (0%)

Injuries to the lateral side, considered secondary to varus strain, constituted only three or 8.3% of the series. Two other knees sustained such severe injuries, that both medial and collateral ligaments were found to be interrupted. An isolated injury to the anterior cruciate did not occur in any of the knees, indicating the trend towards conservative management of this isolated problem.

Documented dislocation occurred in six of the 36 knees. The medial collateral ligament and anterior cruciate were ruptured in five of the six, although only one of the six knees had interruption of the lateral collateral ligament. Injuries associated with dislocation include disruption of the popliteal artery, one peroneal nerve paralysis, and one combined gastrocnemius and hamstring rupture.

Ligament Repairs

The surgeon must use care to determine the integrity of both deep and superficial portions of the collateral ligaments, since repair of both portions is essential. Usually both portions are rup-

tured, as seen in 28 of the 32 medial collateral ligament injuries.

When avulsed at one end, the ligament can be repaired either by stapling the attached fragment or suturing through drill holes. When torn in its substance, the ligament can sometimes be primarily sutured, or redundant tissue plicated. Direct suturing of ligament ends was used in the majority of medial collateral ligament repairs. Reattachment to bone was more often utilized in the lateral collateral ligament repairs (Table 3). The majority of the 24 anterior cruciate ruptures were repaired by reattachment to the bone (Table 4).

TABLE 3
Medial Collateral Ligament Repairs (56)

	Ligamentous Repair	Reattachment to Bone	
		Femur	Tibia
Deep (30)	20	4	6
Superficial (26)	20	2	4
TOTAL	40	6	10

Lateral Collateral Ligament Repairs (6)

	Ligamentous Repair	Reattachment to Bone	
		Femur	Tibia
Deep (4)	0	4	0
Superficial (2)	2	0	0
TOTAL	2	4	0

TABLE 4
Anterior Cruciate Ruptures (24)
Anterior Cruciate Repairs (18)

	Ligamentous Repair	Reattachment to Bone	
		Femur	Tibia
	5	9	4

We found medial meniscus damage to be common, occurring in 16 of the 36 knees. Peripheral tears of the coronary ligament were resutured in five, but the remaining eleven had to be excised because the damage was more severe. Two lateral menisci were removed.

Prompt surgical repair of the third degree tears should be performed as soon as the diagnosis is reached.⁴ Surgery was accomplished within 24 hours in fifty percent of these knees, and during the first week in all but three. Six weeks of cast immobilization with the knee in slight flexion, followed by active range of motion and quadriceps exercises constitute the post-surgical program. One postoperative infection (staph aureus) occurred, resulting in limitation of knee motion.

Results

We obtained adequate follow-up in 22 patients, with an average time interval of 2.2 years. With regard to total evaluation, the patients were

pleased in 17 of the twenty-two cases. The major qualification was "stiffness" in four, and "soreness" in the other, although of these five patients, two were 65 years of age, another had sustained a complete dislocation, and one had the postoperative infection.

Instability did not recur following surgical repair. One patient described occasional giving way and the rest claimed excellent stability. Range of motion and freedom from pain were quite satisfactory in nearly all.

Ability of the patient to return to his previous activity level presents the best objective finding in assessing the results. Patients were able in every case to return to their routine activities of daily living without limitations. All but one, a construction worker, returned to previous employment. Of the 17 patients who previously participated in athletics, ten had resumed them. An additional five felt they could return, but were modifying their activity to protect the knee.

No correlation between delay of surgery and final outcome existed, nor did cruciate ligament

repair correlate with end result.

Conclusions

Knee ligament ruptures occurred primarily in the young adult, although only one-third of the cases resulted from athletic trauma. The vast majority were valgus injuries with 92% of the medial collateral ligaments torn. Stress Xrays demonstrated at least 10mm of joint line separation when the medial collateral is completely torn. Anterior cruciate tears were found in two-thirds of the knees, but never as an isolated lesion. No conclusion could be drawn regarding the importance of anterior cruciate repair. Medial meniscus tears, difficult to diagnose preoperatively, were found in nearly one-half of all the cases. Bony injuries (39%) were commonly associated with all of these cases. Excellent ligamentous stability and function resulted from surgical repair, even in the presence of complete dislocation. We found minimal interference with the post-injury activity level in most patients.

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It's the Law

Death Following Penicillin Injection

An internist saw a 54-year-old man for pneumonia. He administered penicillin and gave the patient a prescription for oral penicillin. While in the pharmacy having the prescription filled, the patient died. The cause of death was anaphylactic reaction to the penicillin.

The internist stated that the patient had not advised him that he was allergic to penicillin. Indeed, one month prior to this most recent injection, the patient had been given penicillin injection with no adverse reaction. A California jury found the internist not liable for the patient's death.

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Brewer v. Trelle (Cal. Super. Ct., Los Angeles Co., Docket No. NCC 6607-B, June 28, 1972). The Citation 26:8, February 1, 1973.

Femoral Shaft Fractures in Children

Treated by Early Spica Cast

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CHILDREN ADMITTED to the Hennepin County General Hospital during the period from April 1970 to December 1972, have been treated by an "immediate" spica casting as a definitive program for femoral shaft fractures. Of forty-one patients in the study, thirty-six had the spica program and five received the traditional traction method of treatment. This retrospective study analyzes and compares the end results.

Garrison's, *History of Medicine* credits Guy de Chauliac (1300-1368) for popularizing the treatment of femoral shaft fractures with weights and pulleys. Similar treatment programs continued in vogue for the next several hundred years. Cushing, in 1898, advocated the spica cast treatment relying on fluoroscopy to determine the fracture fragment's position. A single spica with too much padding to allow adequate counter traction and poor x-ray visualization probably combined to give less than ideal results at the end of the treat-

ment period.

Conwell, in his extensive review of *Acute Fractures of the Shaft of the Femur in Children* published in 1929, cited several orthopaedic surgeons who were treating fractured femurs in children by immediate immobilization using "pins and plaster spica." He emphasized that excellent results could be obtained by following one of three basic programs: plaster cast, plaster cast and traction, and suspension in traction. His analysis also suggested that very young patients treated by plaster, showed better results than older children.⁴

Dameron and Thompson analyzed one-hundred unselected patients treated by the spica cast method. When a fracture was well immobilized, pain was minimal, muscle spasm negligible and shortening was less likely to occur. A double spica cast was used in children to the age of fourteen and general anesthesia was used during cast application. Serial x-ray studies of the healed fractured limb revealed an average of one-sixteenth of an inch increase in length.⁵

Their conclusions were that early reduction in spica cast could be expected to offer excellent re-

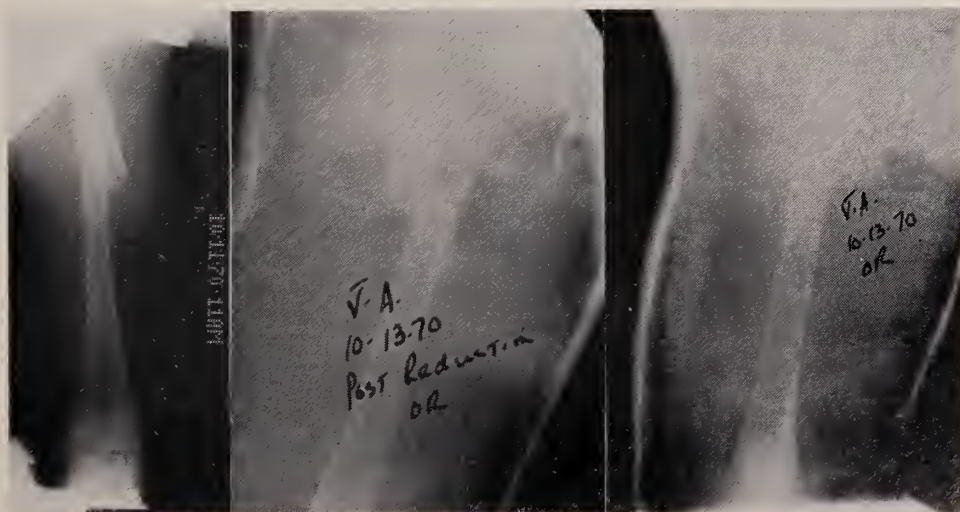


Fig. 1 (A)—Initial and postreduction views.

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sults in pediatric patients. Although the authors noted no serious anesthetic complication, the need for a general anesthetic to apply the cast might be considered to be a disadvantage.

Method

As soon as the child's general condition permitted, a one and one-half spica cast was applied while the patient was under ketamine anesthesia. This agent is a non-barbiturate and produces a dissociative type of anesthesia characterized by relatively profound analgesia, but preserves pharyngeal and laryngeal reflexes. Muscle relaxation may not be as complete as under a general anesthetic. In this series there have been no anesthetic complications.

Russell's skin traction was applied immediately following admission and continued until the application of the plaster. Anesthesia was started while the patients were still in traction and after satisfactory induction, the patient was transferred to a small fracture table. Assistants were used to hold the lower extremities maintaining the fractured limb with the hip abducted 30° , flexed to 60° and the knee flexed to approximately 60° . Another team applied the spica to extend from the costal margin to the toes on the involved side and to just above the knee on the uninvolved side.

Transverse fractures were reduced when possible prior to casting, but if reduction was lost, bayonet apposition was accepted as satisfactory (Figures 1 (A) and 1 (B)). Most of the spicas were applied within three days of admission and the patients were discharged within twenty-four hours after plaster application.

Children treated with the conventional Russell's traction method, usually had other injuries or were hospitalized for extenuating circumstances.

Clinical

Leg lengths were measured on all patients of the spica group and four in the traction group and were compared to teleo-roentgenogram lengths.

Symptoms, problems and gait disorders were recorded when the patient returned for clinical appointment. In instances where patients could not be reached, these factors were checked by letters.

Results

Average ages of children treated by the two methods revealed little difference; six years by traction versus 4.3 years by plaster program.

The average hospital stays showed a much more significant difference: 36 days in the traction group and 5.3 days in the spica group.

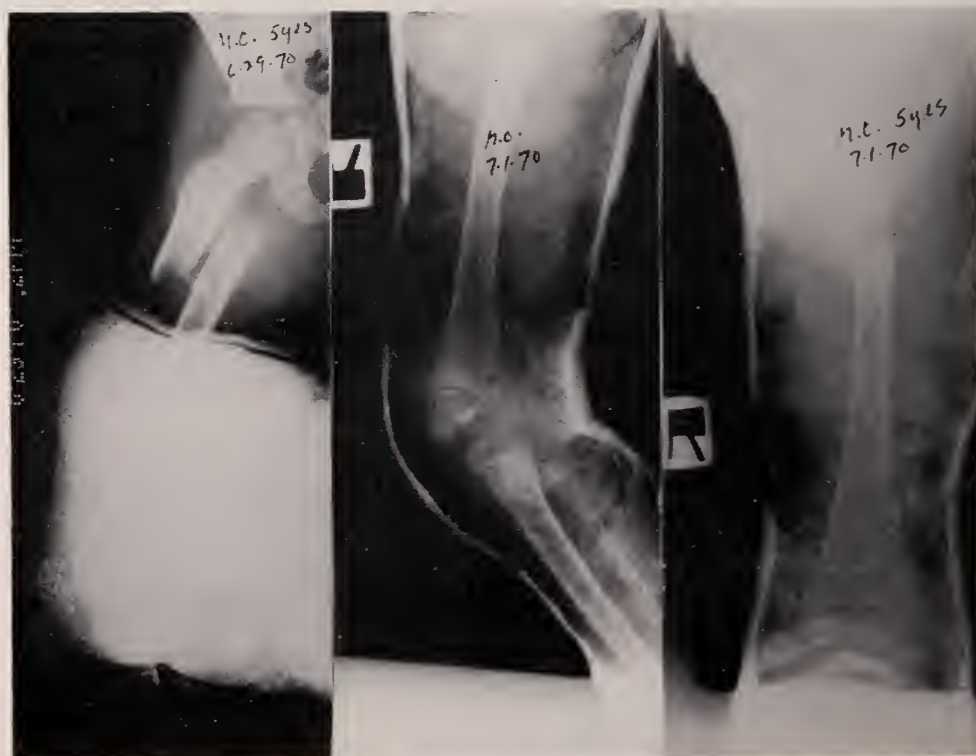


Fig. 1 (B)—Initial and postreduction views.



Fig. 2 (A)—Five weeks in spica cast demonstrating over-riding of the femur.



Fig. 2 (B)—Six weeks in spica cast demonstrating over-riding.



Fig. 3 (A)—Follow-up at four and 10 months demonstrating progressive lengthening.

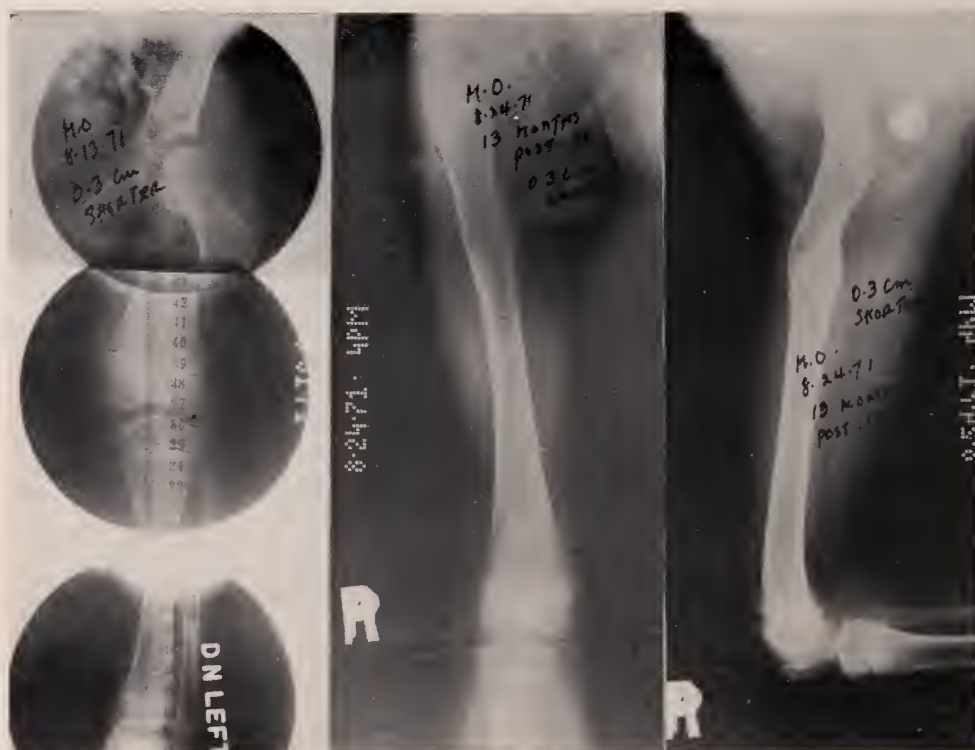


Fig. 3 (B)—Follow-up at 13 months postfracture showing 0.3 cm. of shortening.

The traction group averaged 74 days to weight bearing (36 days in traction, 38 days in a spica). Immediate spica patients averaged 60 days (three days in traction, 56 days in a spica). The difference in time between the groups may reflect a slightly older patient treated in traction.

All fractures healed. Shortening of the involved femur becomes an important potential problem with the immediate cast program [Figures 2(A) and 2(B)]. Ten of the 36 patients in this group exhibited one cm. or more of shortening on clinical measurement and three, as much as two cm. One child who had early x-ray studies demonstrated a shortening of 2.5 cm., had only 1.7 cm. of shortening at 10 months [Figures 3(A) and 3(B)]. No patient had residual disability as a result of shortening.

Four of five children treated in traction showed shortening varying from 0.5 cm., to 2.2 cm. X-ray comparisons of a child with 2.2 cm. of shortening early in his course, showed equal leg length one year following his injury. None of the patients in the traction group had residual functional problems.

Although angular deformity was present on several initial films following cast application, residual angular deformity was insignificant.

Comment

Thompson emphasized that all limbs do not

overgrow, but that transverse fractures in children under the age of six, usually exhibit this tendency to compensate. Oblique and spiral fractures in children over eight years may not exhibit significant growth stimulus. Cole, in 1925, demonstrated that compensatory growth may take place in both tibial and femoral epiphysis.³

Our results were comparable to those obtained by Thompson. Older children appeared more likely to have slight degrees of shortening, but this discrepancy may diminish in the two years following injury. The degree of compensatory growth depends upon the type of fracture and the age of the child. No patient had an unsatisfactory result in respect to leg length discrepancy or disability.⁵

Blount² cautions that "The treatment of a displaced shaft fracture with a plaster cast, requires considerable skill." McKeever stated that "The safest method of treatment of femoral shaft fracture for the average surgeon in the average hospital is traction." Both statements have some element of truth. There should be a place however in the armamentarium for the early spica casting program.

Shortening appears to be controlled by close adherence to the application technique as developed by Thompson.

The treatment of fractured femurs with early cast application decreases hospital stay with no compromise in the end result.

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Course on Alcoholism and Other Drug Abuse

Sunday, July 29th through Friday, August 3rd are the dates for a "Symposium on Alcoholism and Other Drug Abuse" aimed particularly for the Rural Health and Helping Professionals. This symposium is to be held at Mt. Senario College at Ladysmith, Wisconsin and is endorsed by the Education Committee of Wisconsin Academy of Family Physicians for 33 hours of post-graduate credit.

Among the speakers will be Dr. Joe Benforado of Madison and Dr. Dan Anderson of Hazeldon Treatment Center, Center City, Minnesota.

Early registrations are being accepted. Direct your correspondence to: Dean Edwin Blackburn, Mt. Senario College, Ladysmith, Wisconsin. Registration fee: \$5.00 plus \$40.00 for the five day work-shop.

Scoliosis Treatment

Skeletal Maturity Evaluation

WALTER P. BLOUNT, M.D.* and DAVID D. MELLENCAMP, M.D.*

PRESENT DAY management of scoliosis has been significantly influenced by such orthopedic clinics as the one at Fairview Hospital, Minneapolis, directed by John H. Moe.^{4,5,10} Until the early sixties the chronologic age of the patient was generally used in establishing prognosis in the surgical treatment of scoliosis. Since then we have used the skeletal age according to Greulich and Pyle, obtained by comparing a P. A. Xray of the left hand and wrist with standard plates for boys and girls.⁸ This finding is of value only as a prognostic sign. It is useful to a limited degree in judging the likelihood of progression in an untreated patient.^{3,10}

The extensive curve of a juvenile idiopathic scoliosis can frequently be reduced to an acceptable size, and held with the Milwaukee brace, until the patient reaches the optimum stage of development for surgery, skeletal age 12 for girls, and 14 for boys.^{4,5,10} If the chronologic age is three years older or younger than the skeletal, the latter is used. If reference is to the chronologic age, the patient will be either deprived of three years of growth, or kept in the brace three years longer than necessary and operated upon at a more difficult stage of development.⁵ An assessment of skeletal age is mandatory in establishing the best time for surgery in a growing child.

It became evident that we had to find a much more accurate way of estimating spinal maturity in determining when to start weaning a patient whose deformity had been corrected by a Milwaukee brace and exercises. The parents and the patient are concerned about when and how rapidly the brace will be removed. The skeletal age can serve as a warning of the need for a prolonged course of treatment but is of no value in determining when the patient is ready for weaning,³ an entirely different problem. X-ray evidence of spinal maturity is obtained by careful study of the ring apophyses of the vertebra (Figure 1) and the



Fig. 1—12/18/69. Female skeletal age 13 + 5. Standing Xray in the brace shows developing ring apophyses on the convexity of the lumbar curve. With this degree of immaturity the patient had to wear the brace full time until maturity.

(Reproduced with permission from M. L. Verlag, Uelzen, West Germany. From Blount, Walter P. and Mueller, Karl H.: Die nicht-operative Behandlung der Skoliose mit dem Milwaukee-Korsett. Orthopädische Praxis, Heft 6/VIII: 148, June 1972.)

*Milwaukee, Wisconsin.

epiphyses of the ribs. There is no known method of estimating accurately the time of their closure in advance.^{1,7,12}

The maturity of vertebral ring apophyses is determined by a current Xray. However, their fusion to the vertebra does not necessarily permit weaning^{3,5} (Figure 2). It is only an indication for cautious removal of the brace for a trial of the stability of correction. Spinal maturity and stability of correction of a curve rarely occur simultaneously. Maturity usually precedes assured stability.

In establishing skeletal age it is important to obtain a family and menstrual history.^{4,5} The initial physical examination must include a careful evaluation of sexual development and an over-all estimate of apparent age. When the hands are normal, the skeletal age is of great value.⁸ The determination should be recorded at the initial visit, and repeated at intervals of two or three years because the relationship between chronologic and skeletal age may change considerably during development. But the bone age is only a prognostic sign and has no value in determining the patient's readiness for weaning.^{3,5,10}

For many years the iliac apophysis sign of Risser¹¹ has been tragically over-emphasized as an indication of not only spinal maturity, but of stability of correction of scoliosis. There is a vast difference between the stability of spines in treated and untreated patients. During Milwaukee brace management, the wedged intervertebral soft tissues become more rectangular in profile and are vulnerable to collapse when support is removed too soon.³ The findings of Collis and Ponseti⁶ with reference to progression in a 25 year follow-up were based upon the study of untreated patients. We do not accept their figures as prognostic for curves that have been under Milwaukee brace management.

Risser's criteria are about 85% reliable. This means that it is not an acceptable criterion for the other 15%. The only information of importance that can be learned from the iliac apophyses is that when their development is incomplete the patient is immature and must continue with brace treatment full time. Until the iliac apophyses have fused the spine is usually not mature but there is no constant relationship between the maturation of the vertebral and iliac apophyses.

The most reliable index to date of spinal maturity is the state of development of the vertebral apophyses (Figure 1) and the rib epiphyses. We

have found by clinical experience that as long as they are wide open, spinal deformities will likely progress rapidly, even if the iliac apophyses are fused. When the vertebral apophyses are nearly closed, progression is slow. Growth of the vertebral end plates has ceased before this but in the worsening or improvement of the bony elements of spinal deformity, the apophyses play an important role.^{3,10}

Normally the lumbar apophyses close before the thoracic. Not infrequently, in a primary lumbar curve of considerable magnitude, the lumbar apophyses will remain open as long, or longer, than those in the thoracic region. Conversely in a primary thoracic curve, the more cephalad apophyses will fuse even later than normal with reference to the lumbar. That there is a definite relationship between immaturity of the vertebral apophyses and the progression of the curvature is obvious to anyone who has followed a number of patients during non-operative treatment.⁵

Unfortunately we are faced with a variable time interval between complete maturation of the spines in Xray and assured stability of correction. Late follow-up of girls who were 15 at the time treatment was started, disclosed a consistent loss of correction on discarding of braces at maturity.^{3,5,10} The exceptions were the patients who wore their braces at night only until age 19 or 20. There was usually an additional disquieting loss during pregnancy. A discussion of the latter must wait for the completion of a prospective study.

The opinion based solely on reasoning, that improvement or worsening of a nearly mature scoliotic spine takes place as a result of decrease or increase of the wedging of the intervertebral soft parts, has been proved clinically by Dean MacEwen⁹ and confirmed by us. There were insuperable obstacles to the accurate measurement of the height or angles of individual interspaces or vertebrae with present x-ray technics. The findings are exact enough to prove that late worsening of a curve takes place by compression of the discs on the concave side and improvement by reversal of the process, not by changes in the vertebra.⁹

Before 1965 it was axiomatic that the older the patient was when brace treatment was started, the shorter the time the brace would need to be worn. Since then we have learned that the late-starter must wear the brace several years longer at night than the child who received it earlier. The juvenile who began treatment at age 10 may be wear-

ing it at night only by the time he is 13. While in grammar school, patients do not mind wearing the brace, but object to it during the last years of high school when maintenance of correction is so important. Rarely is there any opposition to sleeping in the brace.

In a skeletally 16 year old female, a 40° major thoracic curve that has appeared gradually and shows little deformity of the vertebral bodies but considerable wedging of several apical interspaces, is not likely to get much worse without treatment. If her deformity is not acceptable, she should have a fusion. A Milwaukee brace may correct her deformity slightly, but any improvement will be only temporary unless she continues to wear it full time for two years and at night for two or three more.⁵ Any changes in the spine will be of the intervertebral soft parts which will gradually become more stable after skeletal age 18.⁷ The clinical phenomenon of firming up has no exact anatomic parallel. The age of this developmental change corresponds roughly to that of maturation of the discs as shown at operation and in cadaver studies.^{7,12}

If this same 16 year old girl had been started on efficient non-operative treatment at skeletal age 15, when the vertebral apophyses were still

open, but the ultimate contour of the vertebral bodies was well established, she might have obtained considerable improvement of the list, the curvature, and the rib hump. These changes, also, would have occurred almost entirely by reduction of the wedging of the intervertebral discs. Without treatment her scoliosis would likely have progressed.

If her doctor had become so delighted with her improved appearance after a year of treatment that he allowed her to remove the brace during the day, and at 17 took it off entirely (Figure 2), she would have lost all of the correction of her lateral curvature. The discs would have resumed their initial profile in the A. P. Xray. The scolioses of most girls who start treatment at age 15 are not stable, even at maturity, and the brace must be continued at night until the intervertebral soft parts have firmed up. This concept makes non-operative treatment less acceptable and the problem more complicated for older patients. It does permit us to establish a more valid prognosis. If our 15 year old girl's brief treatment included well-supervised exercises and posture training, she might retain some of the correction of the curve as well as the list and rib hump. She has been prevented from becoming considerably worse. With an original curve of less than 40° , the result will be acceptable, but only because it was acceptable at the start of treatment.

If the curve had been 55° at skeletal age 15, the appearance at age 18 would probably have been unacceptable and one must concede that the effort was wasted. Correction and fusion of



Fig. 2 A—7/3/57. Female, chronologic age 11 + 9, skeletal age 13. Spinal deformity noticed by the parents January 1957 at which time the right thoracic curve measured 17° and the left lumbar 26° . The thoracic curve had progressed considerably by the time this photograph was taken. It was a typical idiopathic right thoracic curve with the torso listed to the right, the right shoulder slightly high and the scapula prominent. There was a corresponding valley on the left side.



Fig. 2 B—7/3/57. On forward bending a considerable rib hump was apparent on the right and the right convex curve persisted.

he major curve is then necessary. This greater-than-borderline curve should have been operated upon at age 15.

During the brace treatment of a 15-year-old girl, carefully made Xrays showed that there had been no change in the shape of the vertebrae but wedging of the intervertebral discs had been diminished.⁹ Some of the interspaces that had been wedge-shaped became nearly rectangular in profile. The correction of this 15 year old spine by the brace and vigorous exercises took place entirely in the intervertebral soft parts. It will not be stable enough to maintain lasting improvement until the soft parts have firmed up. Clinical research is in progress to determine the minimal time that the brace should be worn at night to assure a favorable outcome. Following skeletal maturity at 18, two years is suggested.

The time to discuss prolonged wearing of the brace is not when the maximum correction has been finally obtained but when treatment has been under way for a few months and wearing the brace at night has been found acceptable. If the patient is not willing to continue the use of the brace at night for a final two or three years, even a moderate curve should be fused by operation without delay.^{5,10}



Fig. 2 C—2/5/60. On a program of Milwaukee brace full time and exercises, the patient improved until her appearance in two years was normal. At skeletal age 15 she had been started on a weaning program. After two months she had the brace off four hours five times a week. She wore it at night until June 1959 and then she abandoned it. She retained the correction for six months until this photograph was made.



Fig. 2 D—2/5/60. There was no rib hump whatsoever on forward bending. There was slight prominence in the left lumbar region which was not present when the patient was erect.

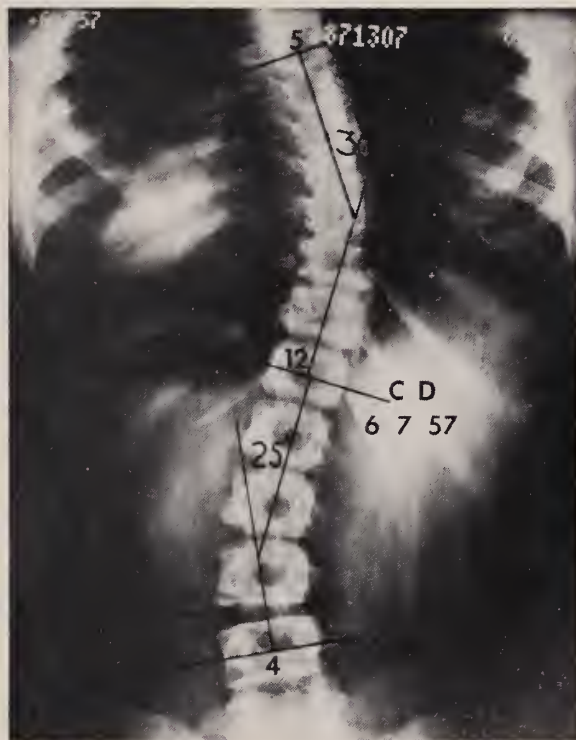


Fig. 2 E—6/9/57. A submitted film did not show the cephalad portion of the thoracic spine but the right thoracic curve had increased to 36° and the left lumbar to 25°. Fusion of the thoracic curve had been advised. In the light of subsequent events this would have been a good plan.



Fig. 2 F—8/17/59. After two years the Xray showed perfect compensation with two curves of 21° . There was no wedging of the vertebral bodies and very little wedging of the intervertebral soft parts. The iliac apophyses had completed their excursions. The patient and her parents were delighted with the result and were most insistent on weaning, which was reluctantly permitted.



Fig. 2 H—7/6/62. On forward bending the rib hump on the right and the valley on the left are clearly visible.



Fig. 2 G—7/6/62. Three years more of vigorous activity did not impair the compensation. The torso and hip line were definitely asymmetrical, and the thoracic valley and rib hump can be seen in this photograph.



Fig. 2 I—7/6/62. In three years without treatment the right thoracic curve had progressed 11° . The patient had obviously discarded her brace too soon. Her skeletal age was now 18. By our 1973 standards she should have been wearing her brace at night only, and for another year or two.

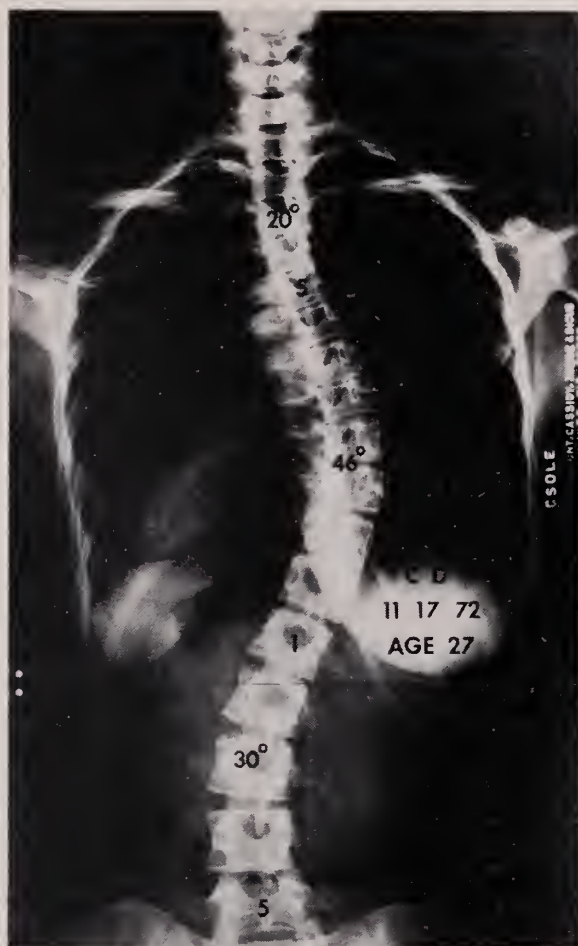
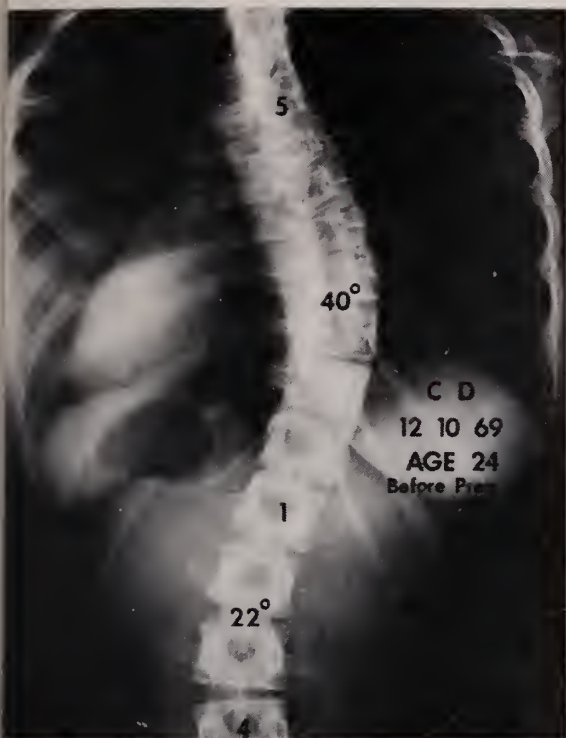


Fig. 2 J—12/10/69. In the seven years and five months between Figures I and J, the patient lost 8°. The measurement was now 40°, five degrees worse than it was when she was first seen. She was still compensated however, and the patient and the parents were satisfied with the result. She was married and delivered a baby in March 1971. She knew that the curve had become worse and thought that the progression had been gradual during the pregnancy.

Fig. 2 K—11/17/72. She returned for examination on November 17, 1972 which was 18 months after the delivery. The right thoracic curve from T 5 to L 1 now measured 46°. This means that she had lost at least 5° since the start of the pregnancy. Vertebra was still rectangular in profile but the interspaces near the apex were more wedged than those in 2 F.



Fig. 2 L—11/17/72. She had a list to the right. A plumb line fell 5 mm. to the right of the gluteal cleft. Her shoulders were level. There was increased prominence of the scapula on the right and depth of the valley on the left. The anteroposterior diameter of the chest was greatly reduced on the left side.

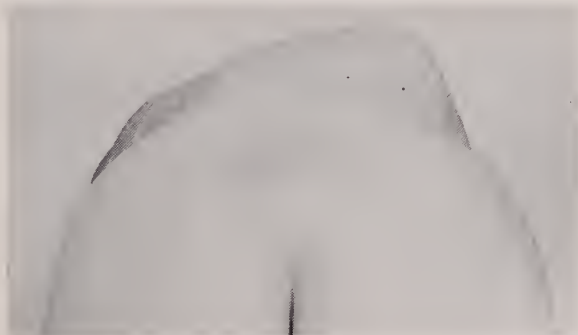


Fig. 2 M—11/17/72. On forward bending the rib hump was now almost as pronounced as at the time of the first examination. The left lumbar protrusion was greater and the valley was deeper. Compensation was characteristically retained, while the patient's lateral curvature had continued to progress. This is the sad story of patients who are weaned too soon and not put back in their braces when a loss of correction is proved by Xray.

There is even wider variation in the age at which the soft parts firm up than there is in the maturation of the bony components of the spine. If laboratory and clinical research can give us accurate tests to determine the stage of development of the intervertebral soft parts, and we are able to control firming up of discs with hormones as we now accelerate the maturation of vertebrae, the weaning schedule of brace patients can be more accurately planned.

With our present meager knowledge, we can say that if a girl's skeletal age is 15 when treatment is begun, but she starts weaning at 17 and abandons her brace at 18 she will be fortunate if she loses only part of her correction. Some lose it all. If she abandons the brace completely at 17 she will likely be worse in a few years than at the start of treatment.

If juvenile idiopathic scolioses of 60° or less, with wedged apical vertebrae, are treated energetically with the Milwaukee brace and exercises, the outcome is strikingly different (Figure 3). They can be corrected dramatically. When the spines are held almost straight for several years, the wedging of the vertebrae will disappear and the bodies will be rectangular in frontal profile. These are osseous changes which mean ultimate stable correction. If a moderate curve is well straightened out (Figure 3), the child may wear the brace at night only from age 12 until maturity and not fear a loss on removal of the brace.⁴ If larger curves are reduced to only 40° , prolonged protection is necessary to assure an acceptable outcome. Fusion at skeletal age 12 may be more acceptable to the patient and the parents, and may give a better cosmetic result.

Summary

The grim outlook for older adolescents can be summarized by saying that girls of 15 with borderline curves of 50 to 55° should be fused rather than treated conservatively unless the patient is inspired to carry out a long course of treatment. Most girls with skeletal age of 13 or less with moderate curves can begin their weaning between skeletal age 17 and 18, abandon their braces at 19 and expect satisfactory results with non-operative treatment.

Scoliosis patients should have an initial sophisticated evaluation of skeletal age. During non-operative treatment the progress of spinal maturation should be followed by clinical and Xray evaluations. Most conclusive of the positive signs is



Fig. 3 A—11/21/66. Female chronologic age $11 + 3$ skeletal age $10 + 9$. The right thoracic curve and prominence of the right scapula are clearly evident. The scoliosis must have been present for a year or more.



Fig. 3 B—11/21/66. On forward bending, minimal rib prominence on the right suggested an early structural curve. This was the time to start treatment.

X-ray evidence of closure of the vertebral ring apophyses.

Spinal maturity is an indication for testing stability of correction by making a standing X-ray after the patient has been out of the brace for three hours.^{4,5} If there is no more than 3° increase of the major curve as compared with the measurement on first removing the brace, the correction is stable. The patient may be allowed to be out of the brace for three hours once a week. Gradually the frequency of the free period is increased until it is three hours daily. This program should

be continued for several months and then the test repeated for six hours. If there is a loss of more than 3° the old schedule should be resumed. Weaning to ten hours out per day should normally take a year. A girl should rarely attend school without the brace before skeletal age 17, usually 18.

It is important to distinguish clearly between skeletal age, spinal maturity and stability of correction. Accurate interpretation of these terms will aid in halting the futile use of the Milwaukee brace in situations where success is impossible.

Reference 1-12 on page 435.



Fig. 3 C—An X-ray at six foot distance with the patient standing showed clearly the structural nature of the 18° right convex curve. T 7 was wedged with diminished height on the left. The lumbar curve from T 10 to L 4 was completely overcorrectable in a supine film with voluntary side bending to the left. This functional curve was partly compensatory for the structural curve above because it stopped at L 4. The right low lumbar curve of 6° would not have appeared had the curve above been due entirely to the 16 mm. higher right ilium. With $\frac{1}{2}$ inch block under the left foot an X-ray showed improvement of the left lumbar curve. Two staples were placed on each side of the right distal femoral epiphysis to obtain slight overcorrection of the inequality. She wore her Milwaukee brace 12 hours at night with lumbar and thoracic pads.

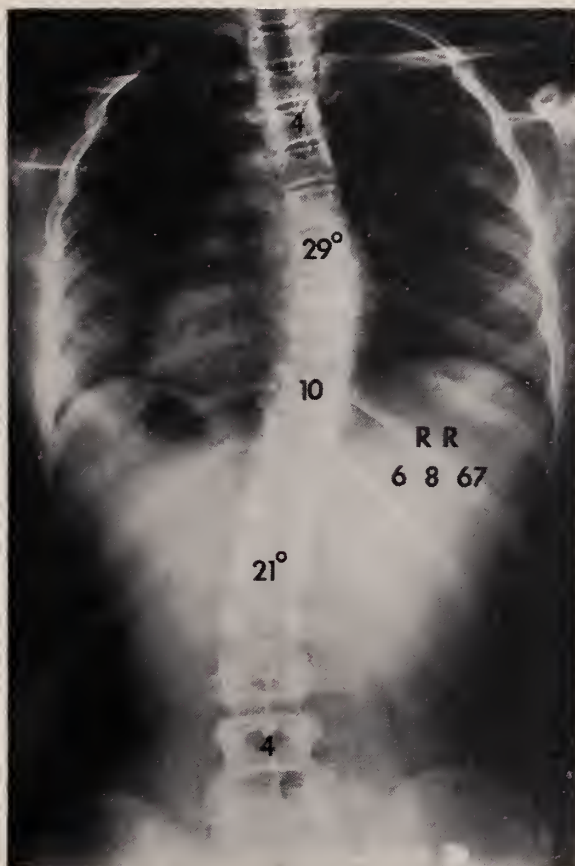


Fig. 3 D—When the patient returned 6/8/67 after three months, X-ray showed the folly of starting with part time use of the brace. The thoracic curve had increased 11° and the lumbar was 2° greater. At skeletal age $11 + 6$ she started wearing the brace full time with daily exercise. Eight months later a standing X-ray showed that the right thoracic curve measured 16° and the left lumbar 11° .



Fig. 3 E—The brace was continued full time for two years. After one year, 7/10/68, when the inequality of leg length was slightly overcorrected, the staples were removed. On 10/17/68 Xray showed the upper curve was 9° and the lower 5° . With this correction she was allowed to be out of the brace three hours once a week, gradually increased to daily.

On 5/26/69 the correction proved stable on a standing Xray after six hours out of the brace. She was allowed to take it off for as much as six hours, but she did not go to school without the brace until the fall of 1969. Then this 14-year-old girl was happy about attending high school without the brace. A small structural curve had been recognized early and energetic treatment augmented by the equalization of leg length had provided good correction.



Fig. 3 G—10/14/71. No deformity could be detected on clinical examination. In the next 18 months she lost some weight but her appearance remained normal.



Fig. 3 F—The brace was worn at night until 2/8/73. Her skeletal age was $17 + 6$. Xray showed skeletal maturity of all epiphyses and apophyses. Correction had stabilized and she had lost nothing on this Xray after being out of the brace 24 hours. The wedging of the body of T 7 was considerably reduced. The right ilium was now 11 mm. lower than the left. The right low lumbar curve had extended up one segment to L 3 and the two lumbar curves were well compensated.



Fig. 3 H—10/14/71. On forward bending there was no rib prominence or asymmetry of the torso. She continued to wear the brace at night for four months and then discarded it to enter the Air Force. After maturity there was no likelihood of significant progression with curves as small as these.

Scapulo-Thoracic Fusion

for

Shoulder Stabilization in Muscular Dystrophy

WILTON H. BUNCH, M.D., Ph.D.*

NOT ALL PATIENTS with muscular dystrophy die in their teens. Those with the limb girdle and fascioscapulohumeral form of the disease may not have their lives shortened greatly. What is shortened, however, is their functional capacities and abilities. Deficiencies in elevation activities and the inability to stabilize the shoulder may seriously hamper vocational opportunities and interfere with activities of daily living. This paper reports bilateral scapulo-thoracic fusion as one solution to this problem.

History

One of the earliest reports of muscular dystrophy was by Meryon³ (1852) who described the disease in two of four affected brothers. The most lucid, early description was that of Duchenne¹ (1868) which presented the clinical course of 13 patients and his name has been associated with the early occurring sex linked recessive form.

In 1884 Landouzy and Dejerine² (1884) reported a group of cases in which the involvement was initially limited to the face and shoulder girdle. These cases have since been called fascioscapulohumeral dystrophy.

Clinical Course

Fascioscapulohumeral muscular dystrophy is transmitted as an autosomal dominant with a wide range of expressivity. The age of onset usually is in the second decade. The muscles most commonly involved are the serrati, trapezii, rhomboids, latissimi and the muscles about the eyes and mouth. Late in the disease the pelvic muscles may also be involved.

This form of the disease generally is benign and Walton⁴ (1961) reports that it is not unusual to find individuals who have had the disease for 40-60 years. In our clinic there are three families in which the disease is much more severe in the



Fig. 1—The range of motion of the arms and shoulders as shown in these illustrations. Note the winging and instability of the scapula.

*Associate Professor of Orthopedic Surgery, University of Virginia, Charlottesville.

children than in the affected parents.

Case Report

A 17-year-old white girl was first seen in the Orthopedic Department of the University of Virginia Hospital in September of 1970 because of her inability to elevate her arms. Two years previously she had noted aching and fatigue about the shoulders which progressed to weakness within six months. Four years prior at age 35 her mother began having similar weakness with minimal progression.

On physical examination she was able to flex her arms to 45° and abduct to 70° bilaterally. She had full active internal rotation and 20° of external rotation. All motions were accompanied by a great deal of winging of her scapula. See Figure 1. Function of the supra and infraspinatus muscles was fair, the trapezius fair, the deltoid good, and the triceps and biceps normal. When the scapula was manually stabilized against the rib cage, she was able to forward flex 140° and to abduct 150° .

Enzyme studies, electromyogram and muscle biopsy were consistent with the diagnosis of fascioscapulohu-

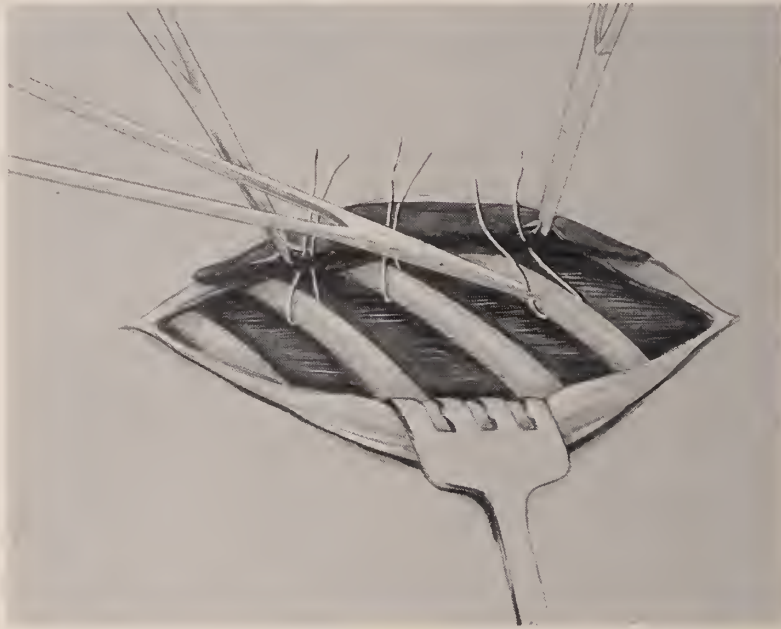


Fig. 2—This artist's sketch shows the ribs cleaned of periosteum and the placing of the wires.



Fig. 3—This sketch shows the wires placed through the scapula to provide fixation and the cancellous graft between the ribs.

neral dystrophy. Despite this diagnosis and her weakness, her vocational counselor was urging a career as a beautician.

Operation

The scapula was approached through an incision beginning over the medial one-third of the spine of the scapula and the infraspinatus detached subperiosteally. The scapula was then elevated and the subscapularis muscle removed subperiosteally and resected as close to the axillary border as possible. The third through fifth ribs were exposed subperiosteally for their entire circumference along a distance of about four centimeters. Care was taken to avoid the segmental artery and nerve along the inferior border of the rib. Five pieces of

number 18 wire were placed under the ribs, two under the third and fourth and one under the fifth rib (Figure 2). Each of these were passed through the scapula. A generous cortical and cancellous graft was taken from the posterior wing of the ilium and laid between and over the ribs (Figure 3). The scapula was then drawn down against this mass of bone and the wires tightened, cut and bent. This provided good fixation of the scapula against the ribs and the bone graft. The patient was placed in a bi-valved shoulder spica.

She was kept in the shoulder spica for three months. Xrays then showed solid fusion between the ribs and scapula. One year later she returned requesting surgery for the opposite side which was treated in the similar manner.

Postoperative Status

At 30 and 18 months postoperatively she has 160° of flexion, 130° of abduction, 30° of external and 80° of internal rotation of her humerus. Her scapulae are stabilized and cosmetically improved (Figure 4). She is able to comb or brush her hair. She can dress and feed herself but is somewhat limited in dressing in that she must fasten her bra in front.

The Table shows her pulmonary function tests before and after operations. The rib fusions have reduced her vital capacity but she has noticed no limitation in activities.

TABLE

	Vital Capacity		
	Predicted	Measured	Per Cent
Preoperative	3625 cc	3415 cc	94%
After First Fusion		3065 cc	85%
After Both Fusions		2631 cc	74%

This data shows the effect of bilateral fusion of the scapula to the rib cage on the vital capacity. The stability was achieved at the cost of 800 cc of vital capacity.

Discussion

Various procedures have been proposed to stabilize the scapula; of these, muscle transfers and



Fig. 4—The postoperative range of motion of the arms is shown in these illustrations. Note the stability and cosmetic appearance of the scapula.

fascial tenodesis predominate. Scapulo thoracic fusion has not, to the author's knowledge, been previously reported. In this girl, fusion of her scapula to her rib cage has provided permanently increased function.

Rigidity has been accomplished at the cost of compromise of her vital capacity. If this had been reduced at onset, such a procedure would be inadvisable. It might be possible that one side could be fused providing excellent stability and fascial tenodesis used on the other side. It is also likely that fusion of only two ribs and the one intervening space would provide adequate stability,

thereby reducing the effect on the vital capacity.

The position of the scapula is critical to permit maximum abduction. The first 30° of abduction occur at the scapulo-humeral joint. The remaining abduction occurs at both the scapulo thoracic and scapulohumeral joints in the ratio of 1:2. If the scapulae were fused in vertical position, much of the remaining motion would be lost. By placing the scapula in 10-15° rotation, an additional 20-30° of abduction can be obtained thus giving a total abduction of 130°. There is no apparent loss of adduction with this position.

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Minnesota Society of Clinical Pathologists

Dr. Donald J. Nollet has been elected President of the State Society of Clinical Pathologists succeeding Howard Taswell of Rochester.

A pathologist for 18 years at Hibbing General Hospital, Dr. Nollet has been a member of the Committee on Blood and Blood Banks of the State Association for many years. He also served on the Food and Drug Administration's Diagnostic Products Advisory Committee (HEW).

American Psychiatric Association

All psychiatrists who have not already taken the Psychiatric Knowledge and Skills Self-Assessment Program (PKSAP), are urged to apply for it by writing to the APA, 1700 18th Street, N.W., Washington, D.C. 20009. The test stresses patient management problems, allows participants to score themselves in relation to peers, and earns credits for continuing medical education.

Cover Photograph

"Iron Creek"

Dr. H. Dawes Miller's summer home is located in a remote section of the Black Hills National Forest, and about one and a half blocks from his home is "Iron Creek" pictured on this month's cover. He told the editors that this valley is a most beautiful spot, and each summer he searches out with his camera unusually lovely portions of the valley. He finds that one year is more beautiful than the last. The valley itself is located between two highways, two and a half miles from one and four and a half miles from the other with ten bridges coming in from one and seven bridges and six fords the other way.

Dr. Miller is Director of Medical Education at Fairview Hospital, Minneapolis, an amateur radio operator and enthusiastic photographer.

Distal Humerus Fractures

Transolecranon Approach

PHILIP HALEY, M.D.,* JOSEPH TAMBORNINO, M.D.† and RAMON B. GUSTILO, M.D.‡

METHOD OF OSTEOTOMY

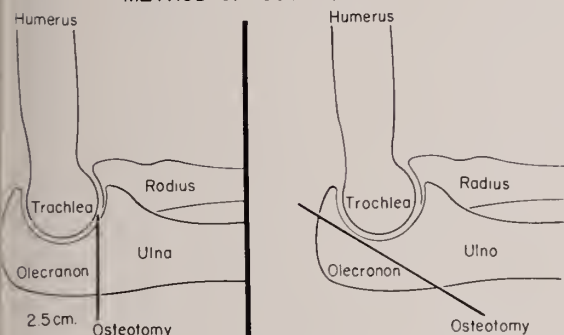


Figure 1

EXPOSURE AVAILABLE BY OSTEOTOMY

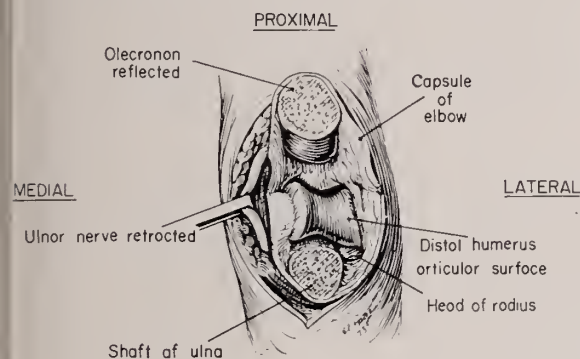
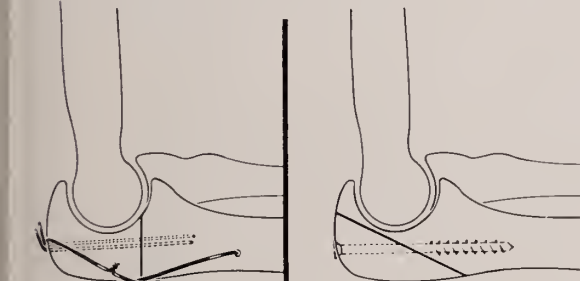


Figure 2

INTERNAL FIXATION OF OSTEOTOMY



TWO PARALLEL STEINMAN PINS
AND TENSION WIRE TIED
IN FIGURE OF EIGHT

Figure 3

THIS IS A review of the transolecranon approach to distal humerus fractures and the records of seven patients whose fractures were operated this way.

A necessary premise is that all fractures presented required open reduction and internal fixation; therefore, attention will be focused on a surgical technique rather than on a principle of fracture treatment.

The records of seven patients were examined: two from Hennepin County General Hospital, one from St. Paul Ramsey Hospital and four from private hospitals in the Twin Cities.

Although this surgical approach had been described previously Dr. Cassebaum⁴ was the first to present a series of patients in which this technique was used exclusively. A number of articles on the subject have appeared since and refer to Dr. Cassebaum's as their source.

The method is known in other countries and some of the literature would imply that it is frequently used.

Extensive exposure of the elbow joint and prevention of adhesions are said to be the advantages. The disadvantage is that it necessitates further repair of an already complicated fracture. Cassebaum does not feel that this approach is more traumatic than incision through the triceps.

Technique

Two skin incisions have been recommended. Most authors use a posterolateral longitudinal incision, but there is also a Y-shaped incision centered just distal to the olecranon. After incision, the very next step is identification and isolation

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Presented at the Ortho/Trauma Seminar, November 3 and 4, 1972, Hennepin County General Hospital.

of the ulnar nerve. It must be retracted safely out of danger.

The olecranon will shortly be osteotomized, but first consider how it will be repaired. If a screw is to be used, it is advisable to pre-drill so reduction of the osteotomy will be correct.

The olecranon is sectioned obliquely, by V-cut pointing distally, or transversely at a point 2.5 centimetres distal to its tip. Expose the elbow joints and the fracture fragments so the fracture can be examined and reduction can be practiced. After fixation and stabilization of the fracture, the osteotomy can be repaired with tension bands

or a screw. The surgeons of the Association for the Study of Internal Fixation use both a malleolar screw and a tension band. Cassebaum uses a single screw placed obliquely from the olecranon through the cortex of the ulna, distal to the osteotomy. Figures 1, 2 and 3 depict substantially this procedure. The ulnar nerve should be transposed anteriorly if its course is in any way jeopardized by fracture fragments or fixation devices.

After surgery, the type and time of immobilization will depend on the stability of the osteosynthesis. Early motion is a goal of the internal

TABLE 1

Case	Age	Associated Injuries	Complications	R O M	Notes
1	30	Colles Fx.	Resolving mild ulnar neuropathy	20-130	Splinted 27 days Pins removed at 27 days
2	69	Colles Fx.	Slightly limited supination	28-130	Splinted 18 days Pin removal at 42 days
3	65	Colles Fx.	Morning stiffness in elbow and wrist	30-115	Splinted 29 days Pin removal at 44 days
4	50	Colles Fx.	Ulnar Palsy	60-95	Splinted 32 days
5	56		Ulnar hypesthesias and weakness	30-95	Immobilized 9 days
6	56		Slight ulnar hypesthesias and weakness	20-90	Open Fracture, previous attempt at internal fixation. Ulnar nerve transposed. Splinted at 62 days. Pin removal at 34 days
7	76	Bilateral femur Fx. Patellar Fx.	Slightly limited shoulder motion	30-90	Splinted 26 days 1 pin removed at 6 weeks



Fig. 4—Distal humerus fracture sustained in a fall.

fixation and most references indicate this should be started as soon as comfort and stability allow. The fixation devices should be removed at a later date, since this improves function.

Seven cases have been operated this way. A summary of each is presented briefly in Table 1. Figures 4, 5 and 6 are representative of the oste-

otomy of the olecranon and the internal fixation of the fracture.

Evaluation of Results

There have been several methods of grading results published. Drs. Bryan and Bickel³ at the Mayo Clinic have classified results according to



Fig. 5—Open reduction and internal fixation. The olecranon has been osteotomized transversely.



Fig. 6—Appearance of elbow two months post fracture, after removal of Steinman pins.

three of these and found them to be comparable. The results of the cases presented here are graded similarly, but with minor variation.

The standards for an excellent result require a pain-free elbow with a nearly normal range of motion. A good result consists of range of motion 30 to 115 degrees with or without mild symptomatology. A fair result includes significantly decreased range of motion and moderate symptomatology. Pain, deformity, instability, or greatly diminished range of motion constitute a poor result.

TABLE 2
Criteria for Evaluation

Excellent:	Painfree
	Near normal range of motion
Good:	Range of motion 30-115
	Mild symptomatology
Fair:	Significantly decreased range of motion
	Moderate symptomatology
Poor:	Pain, deformity, instability
	Greatly decreased range of motion

By these references, the seven cases presented include three good, three fair, and one poor result. No excellent result was obtained. The poor result was in a patient who had originally achieved 60° total flexion-extension and then regressed to 35°, from 60 to 95. She also had an ulnar nerve palsy.

Discussion

This is a fairly uncommon fracture and general agreement is that it is a difficult fracture to treat since regardless of the method of management, some limitation of elbow function is to be expected. The trend at this time is toward open reduction and internal fixation on the assumption that this will permit more nearly anatomical restoration of the fracture and earlier use of the joint. Results

of these fractures treated this way will be a reflection of surgical methods.

TABLE 3
Results and Evaluation

Case	R O M	Notes	Evaluation
1	20-130 (110)	Resolving slight ulnar weakness and hypesthesia	Good
2	28-130 (102)	Slightly limited supination	Good
3	30-115 (85)	Slight morning stiffness in elbow and wrist	Good
4	60-95 (35)	Ulnar nerve palsy	Poor
5	30-95 (65)	Ulnar hypesthesias and weakness	Fair
6	20-90 (70)	Slight ulnar weakness and hypthenar atrophy	Fair
7	30-90 (60)	Slightly limited shoulder motion	Fair

Since only seven cases are presented, each with limited time of follow-up, there is too little evidence to argue convincingly that these fractures should be opened or that if they are opened, that this is the technique of choice. There is already considerable literature expressing the value of operation and a small bit concerning this method. These cases add to the information available on this technique and would indicate, if time will bear it out, that comparable results are attainable this way.

Olecranon osteotomy is a practical approach to this articular fracture because it provides a complete view of the fracture, it is not technically difficult and, depending on the plane of the osteotomy, it need not add further damage to the articulating surfaces.

This approach should be considered when preparing to operate on distal humerus fractures.

Acknowledgment

We would like to acknowledge Dr. Thomas Comfort and Dr. Peter Strand for use of some of their cases in this presentation.

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The March issue of MINNESOTA MEDICINE, page 243, "Drug Related Terms" carried the authors as Dunean Jones and Michael Ralke. The authors of this excellent glossary are: Dunean A. Rose and Michael Ralke.

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John H. Moe, M.D.

Retiring Professor and Chairman of the Department of Orthopaedic Surgery at the University of Minnesota.*

*Will continue in active practice in his chosen field of scoliosis.

Dr. John H. Moe Alumni

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Lloyd Leider, M.D.	Robert Winter, M.D.

Editor's Note: This list was submitted by Dr. Ramon Gustilo and is probably incomplete. We would like to hear from others who have received part or all of their training under Dr. Moe.



Editorials

John H. Moe, M.D.

JNTIRING DEDICATION, industry, resourcefulness and humility epitomize John H. Moe, retiring Professor and Chairman of the Department of Orthopaedic Surgery at the University of Minnesota, for whom this issue is dedicated. He has devoted thirty-two years of his life to orthopaedic surgery—the training of residents and the care of patients, particularly with problems of scoliosis of the spine.

In his early years of medical practice, Dr. Moe tackled the most challenging and difficult problem in orthopaedic surgery at that time with all his human resources—the curvature of the spine. He labored continuously many hours a day studying the basic types of scoliosis, analyzing critically the progression of the deformity and improving the existing treatment of scoliosis and became the leading authority on this neglected problem. Dr. Moe became very skillful, particularly in the application of the Risser's cast in achieving correction and the fusion technique and he developed a meticulous facet fusion with bone graft, hence called the Moe Facet Fusion. Dr. Moe doing a scoliosis fusion could be compared to an artist doing his masterpiece for he achieved correction better than most. His analysis and reporting of results were honest and critical and his fusion rate and correction of deformity surpassed his predecessors. Moe operated on kypho-scoliotic deformity most orthopaedic surgeons refused to do.

One singular trait of his was to recognize clinical advances in a rapidly changing medical world. With the advent of the Harrington rod instrumentation and its application, he immediately realized

the vast potential of this device in the correction of scoliosis. Good correction of the most severe deformity of the spine, which in the past had been treated by conscious neglect or a common medical phrase, "nothing can be done about it!" presented no problem to him.

Along with his well-known ability on the surgical methods of correcting the deformity of the spine, Dr. Moe adapted the Milwaukee brace, devised by a long time friend, for the correction of scoliosis and mild curvature of the spine in adolescence. The best scoliosis center and teaching seminar in the country was organized by him.

In 1957, when he became head of the Division of Orthopaedic Surgery at the University of Minnesota, he applied his full energy to the development of the program. His residency program is a total complement of quality and quantity of reconstructive surgery and trauma in adults and children involving six major institutions. In a short period of time, his orthopaedic residency program attained recognition internationally as an excellent and well rounded program. To attest to the excellence of his program at the University of Minnesota, over ninety licensed medical physicians applied for four residency positions in 1972. He challenges and demands from his residents 100% dedication to their job.

In recognition of his contributions in orthopaedic surgery both as an educator and a clinician, his colleagues bestowed upon him the highest honor, the presidency of the American Orthopaedic Association in 1972. In spite of all of his accomplishments in orthopaedic surgery, John remains a



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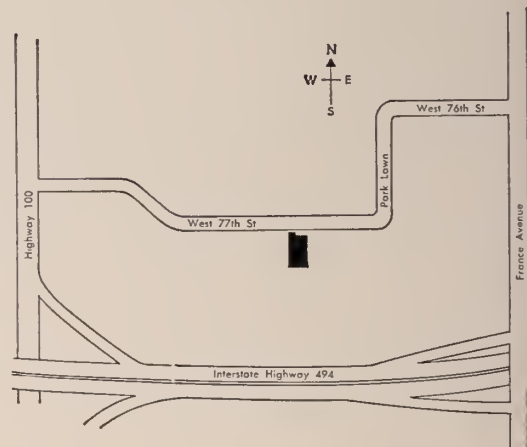
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EDITORIALS

umble man always willing to listen to problems of his residents and fellow physicians and share his knowledge with them. His patients trust him; his colleagues respect him; his residents admire and

seek to emulate him. No man is more deserving of such tribute than JOHN H. MOE.

Ramon B. Gustilo, M.D.
Guest Editor

Bones Backs and Braces

"The axe slipped and cut off my leg. So I went to the tinsmith and had him make me a new one out of tin."

MINNESOTA MEDICINE observes the imminent academic* retirement of John Moe, chairman of the department of orthopedic surgery at the University of Minnesota devoting the May issue to that specialty. Orthopedics has but one derivational meaning, straight children, and Moe, a purist, has chosen that description to define his goal in his specialty. His life work has been devoted to the correction of the wayward deviation of the adolescent spine. He has become the acknowledged authority on youthful scoliosis and his legacy to his students and colleagues in the craft of bone disease is the successful treatment of spinal curvature.

MINNESOTA MEDICINE has published some of his communications in this field†

Since World War II, orthopedics, in common with all branches of medicine, has undergone revolutionary change. Moe's aggressive therapy for increasing spinal deformity is an example of remarkable change in therapeutic approach. Another is the use of prostheses to replace ball and socket and hinge joints for fracture and other destructive processes.‡ Orthopedics today can replace destroyed joints with plastic and metal. We are in the era of the Tin Woodman.§ What was hopeless joint deformity and disability yesterday represents only an operative challenge today.

MINNESOTA MEDICINE is indebted to Raymond Gustilo, guest editor, former resident under John Moe in Orthopedics at the University of Minnesota (Minneapolis) for this issue, a work of love.

Reuben Berman, M.D.
Editor

*Dr. Moe will continue in active practice in his chosen field of scoliosis.

†Winter, Robert and Moe, John: Idiopathic scoliosis—Current concepts in the Treatment. Minnesota Med 55:529, 1972.

‡See page 358.

§Baum LF and Denslow WW: The Wizard of Oz. Bobbs-Merrill, Indianapolis, 1900.

Respiratory Assistance in the Newborn

THE EXCELLENT ARTICLE ON RESPIRATORY ASSISTANCE by Burke-Strickland* summarizes the various mechanical modalities available for the support of the neonate with respiratory fatigue progressing to insufficiency. Diagrams to elucidate the technical construction of the various systems are an excellent complement to the article. These systems require meticulous observation and frequent adjustments by both attending physician and nurses. The complications of such modalities of assistance have also been presented. Infection due to bacterial contamination in the water reservoir attached to the respirator tubing should also be mentioned to stress the need for meticulous surveillance of

the apparatus as well as the patient.

This article discusses the scientific techniques that have been devised to assist the neonate whose aberrant pulmonary physiology produces progressive respiratory distress. The physician must decide when the neonate is beginning to develop respiratory fatigue and when it is necessary to institute appropriate assistance or to transfer the child to an appropriate center before apnea occurs. The frequent, careful assessment of the respiratory pattern and associated biochemical determinants by attending physician and nurses is the only way that this potential need for respiratory assistance can be decided. As a result of careful monitoring, quality survival of more distressed neonates can be achieved.

Phillip A. Rierson, M.D.
Minneapolis, Minnesota

*See page 419.

"The Majority of Men Live Lives of Quiet Desperation" - Thoreau

Thoreau's sad, brutal quotation reflects with disquieting honesty our human condition.

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Infectious Complications following Abortion

PERFORMING ABORTIONS on an ambulatory basis has recently received much publicity. The Supreme Court's decision which ruled abortion in the first trimester a procedure without controls has increased the interest of both the medical and non-medical public in this practice. A recent article in this journal implied that ambulatory abortion was a benign, almost perfectly safe method of terminating pregnancy in the first trimester.

Gaziano and Kaplan in the April issue* of MINNESOTA MEDICINE remind us that there are definite hazards to legal abortion and report a series of post-abortion infections. These infections probably would not have appeared in the morbidity statistics of the clinics in which the abortion was performed because the infection occurred after the patient was hundreds of miles from the abortion facility.

Legal abortion was touted as a measure to eliminate the risk of infection that frequently followed criminal abortion. Though recent articles have emphasized the decrease in hospital admissions for infected criminal abortions, this report is one of the first to point out that infection may also be a significant problem in legal abortion.

Non-adherence to the rules of strict sterile technique as practiced in the hospital operating room may extract a costly price in terms of post-abortion infection. Though the type of facility in which these ambulatory abortions were performed is not stated, the article points out one real hazard of this approach. Although a strict sterile surgical technique removes the abortion from the non-medical procedure atmosphere that the "free standing" clinic promotes, it better protects the life and health of those women who choose to be aborted. The minimal sterile technique used in "free-standing" or ambulatory abortion clinics is to be deplored.

Though at the moment there are no legal controls on who, where, or when abortions may be done in the first trimester of pregnancy, Gaziano and Kaplan's article should force us to consider some type of quality control on abortion facilities and procedures. If abortion is to be performed as an ambulatory service it should be done in a "surgi-center" or outpatient operating room type of facility in which strict sterile surgical technique is maintained.

The incidence of infection following legal abortion in this country has not been established. Unless accurate, complete follow-up and reporting is required, the exact risk of post-abortion infection will never be known.

Peter Fehr, M.D.
Minneapolis, Minnesota

See page 269.

Letter to the Editor

Concurrence of Achalasia with Adenocarcinoma of the Stomach

DOCTOR FROMKE in his editorial "Concurrence of Achalasia with Adenocarcinoma of the Stomach" in the January issue, 1973*, made several good points. I also agree that it is difficult to make a diagnosis of carcinoma in some of these patients. This problem should by and large be alleviated by treating the patient as soon as the diagnosis is made. Treatment should consist of either

pneumatic bougienage, or the Heller procedure. No patient should be treated by either of these methods without first being esophagoscoped. With flexible fiberoptic esophagoscopy available in this community to the extent that it now is, there should be no reason why this should not be performed routinely. The procedure is no longer uncomfortable or difficult.

Michael Levy, M.D.
Minneapolis, Minnesota

*Page 45.

Letter to the Editor

Operation on Demand?

The word "abortion" is derived from the Latin meaning "incomplete development." It may be defined as an "immature product, a misshapen thing, a monstrosity."

Spontaneous abortion is the physiologic process occurring usually when the embryo has been imperfect in its development—a mercifully divine solution for a mishap of Nature; but unfortunately, spontaneous abortion does not always occur, and a deformed or abnormal baby may be born: the result of measles, syphilis, inbreeding, idiocy, some types of criminality, some drugs, inherited congenital defects and diseases, and some mental or neurologic disorders.

Induced abortion is a minor surgical procedure designed to terminate the development of the embryo when the life or health of the mother or the fetus may be at stake.

Only after laws were passed designed to discourage unethical doctors from doing abortions in normal pregnancies, when there were no hazards, the term accumulated an immoral-sounding eponym, and became a "criminal abortion." With these laws the responsibility of performing an abortion was taken from the doctor, even though he may have thought the procedure necessary to save the life or health of the mother or child. The responsibility for the decision was, in effect, turned over to the legal profession, and the physician who performed the abortion for any one of a host of medical reasons, not specified in the law, became liable for criminal prosecution, a jail term and a revocation of his medical license.

Now, the United States Supreme Court has indicated that the abortion laws are unconstitutional, and the decision to do the operation, no matter what the indication, has reverted to the doctor where it should have remained. Or has the decision, in effect, now been transferred on demand to the wife or husband, the unmarried woman, the pregnant teenager, the mistress or her paramour, or to an advocate of population control?

Certainly our medical ethics should move out of the bleachers—quickly—into a box seat. Never in the history of Medicine has the decision for the need of any surgical operation been the prerogative of the patient. The patient, of course, may accept or reject the decision of the surgeon, but the responsibility of determining the medical indication for any operation has always been, and should remain, with the physician. Would the ethical physician, on demand, remove a normal finger, an eye, an ear, a uterus? He would not!

For now, during a temporary period of floundering, a few unthinking doctors may briefly disregard their avowed ethical code; but most doctors will continue to practice within the time-honored ethics of their noble profession. They will make their decisions to recommend the abortion procedure on the basis of the health or the life of the mother or the fetus.

"On demand" is not an indication!

Carl O. Rice, M.D., Ph.D.
Editor Emeritus

The Minnesota State Medical Association's position with respect to abortion, in the wake of the recent Supreme Court decisions, was presented to the Minnesota State Legislature recently by Dr. Richard Anonsen, speaker of the House of Delegates. The position paper states that with respect to all abortions the Association recommends that they should be performed only by a licensed physician, and that with respect to abortions performed during the first trimester, the Association recommends that no other restrictions be placed upon abortions.

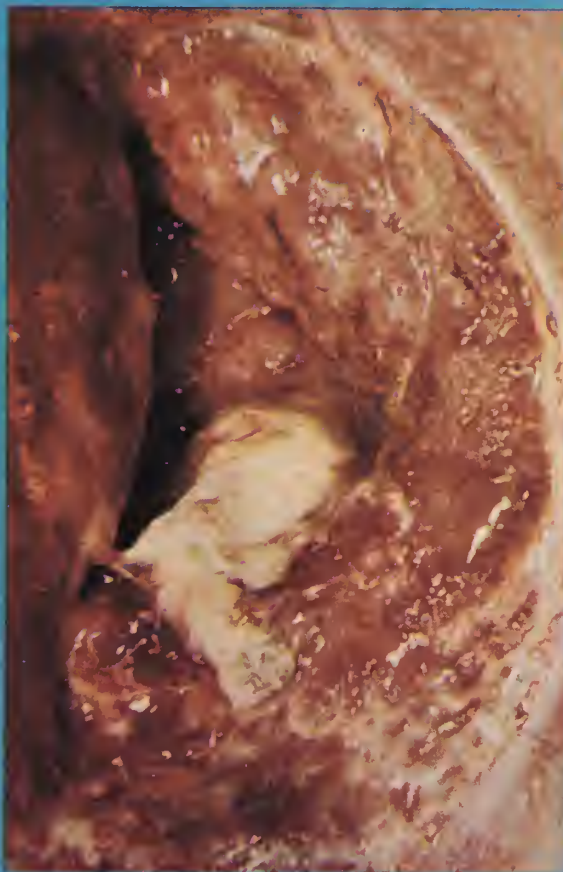
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ive Therapy—Observe Its Effects in 48 hours
The recommended nursing technique is applied without deviation, this procedure can show a visible improvement within 48 hours of treatment. If no dissolution of slough occurs by then, further application is unlikely to be rewarding. Take a break in procedure, usually due to use of drying or antiseptic agents which impair the effectiveness of the enzyme in TRAVASE).

Observation and photos by Kathleen Brough, M.D., Marion County Home, Indianapolis, Ind.

See next page for prescribing information

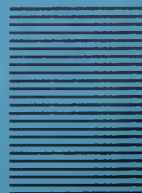
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Travase® Ointment brand of Sutilains

APPLICATION TECHNIQUE: TRAVASE Ointment is indicated as an adjunct to established methods of wound care for biochemical debridement. It dissolves and facilitates the removal of necrotic tissues and purulent exudates.

TRAVASE enzymes are selective. Virtually inactive on viable tissue. When this recommended nursing technique is followed without deviation, this procedure can generate visible improvement within 48 hours . . .



(Ulcer being irrigated)
Thoroughly cleanse and irrigate the wound area using only sterile water or sodium chloride solution. Be sure to cleanse the wound of any antiseptics or heavy-metal antibacterial agents which may interfere with the enzyme activity.



Thoroughly soak the wound area. Where practical, tubbing or showering is suitable. Or wet soaks with gauze pads may be used. Remember to avoid chemical cleansing agents which may interfere with the therapy.

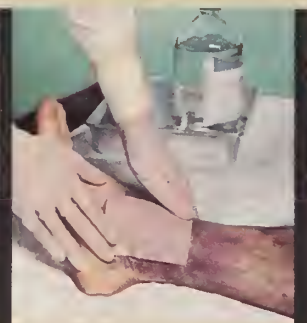


With a sterile cotton swab or finger cot, apply a very thin layer of TRAVASE Ointment. The ointment spreads easily and only a small amount is needed (a small dab of ointment will cover an area as big as the back of a hand).

Be sure, though, to rub the ointment well into every crack or crevice of the wound and overlap the surrounding skin one-fourth to one-half inch beyond the area to be debrided—to be sure of complete coverage.



Apply loose, wet dressings, thoroughly soaked in sodium chloride solution or sterile water to the area to be debrided only.



Cover the moist dressings with an occlusive wrap (Saran wrap, Telfa Pads, or other plastic wrappings) to keep wound site moist. Do not extend occlusive wrap over 1/2 inch beyond area to be debrided.



When changing dressing, gently wipe away the dissolved material. Repeat the complete dressing procedure, including application of TRAVASE Ointment, four times daily.

The ulcer shown in these photos is simulated on a model in order to demonstrate the correct TRAVASE application technique.

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Please send:

_____ Additional Information on TRAVASE® Ointment (brand of Sutilains)

_____ In-service training program

_____ Comment _____

DESCRIPTION: TRAVASE® (brand of sutilains) Ointment is a preparation of proteolytic enzymes, elaborated by *Bacillus subtilis*, in a hydrophobic ointment base consisting of 95% white petrolatum polyethylene. One gram of ointment contains approximately 8 units* of proteolytic activity.

ACTION: TRAVASE Ointment selectively digests necrotic soft tissue by proteolytic action. It dissolves and facilitates the removal of necrotic tissues and purulent exudates that otherwise impair formation of granulation tissue and delay wound healing (4).

At body temperatures these proteolytic enzymes have optimal activity in the pH range from 6.0 to 6.8.

INDICATIONS: For wound debridement (1,2)—TRAVASE Ointment is indicated as an adjunct to established methods of wound care for biochemical debridement of the following lesions:

- Second and third degree burns,
- Decubitus ulcers,
- Incisional, traumatic, and pyogenic wounds,
- Ulcers secondary to peripheral vascular disease.

CONTRAINDICATIONS: Application of TRAVASE (brand of sutilains) Ointment is contraindicated in the following conditions:

- Wounds communicating with major body cavities,
- Wounds containing exposed major nerves or nervous tissue,
- Fungating neoplastic ulcers,
- Wounds in women of child-bearing potential—because of laboratory evidence of effects of TRAVASE upon the developing fetus.

WARNING: Do not permit TRAVASE Ointment to come into contact with the eyes. In treatment of burns or lesions about the head or neck, the ointment inadvertently come into contact with the eyes, it should be immediately rinsed with copious amounts of water, preferably sterile.

PRECAUTIONS: A moist environment is essential to optimal enzyme activity. Enzyme activity may also be impaired by certain agents such as several detergents and antiseptics (benzalkonium chloride, hexachlorophene, iodine, and nitrofurazone) may render the ointment ineffective to the action of the enzyme (3). Compounds such as containing metallic ions interfere directly with enzyme activity to a slight degree, whereas neomycin, sulfamylon-streptomycin, and other antibiotics do not affect enzyme activity. In cases where adjunctive topical therapy has been used and no dissolution of slough occurs after treatment with TRAVASE Ointment for 24 to 48 hours, further application, without interference by the adjunctive agents, is unlikely to be rewarding.

In cases where there is existent or threatening invasive infection, appropriate systemic antibiotic therapy should be instituted concurrently.

Although there have been no reports of systemic allergic reactions in humans, studies have shown that there may be an antibody response in humans to absorbed enzyme material.

ADVERSE REACTIONS: Adverse reactions consist of mild, transient pruritus, paresthesias, bleeding and transient dermatitis. Pain usually controlled by administration of mild analgesics. Side effects are usually enough to warrant discontinuation of therapy occasionally have been reported.

If bleeding or dermatitis occurs as a result of the application of TRAVASE (brand of sutilains) Ointment, therapy should be discontinued until the reaction has subsided. Toxicity has been observed as a result of the topical application of TRAVASE Ointment.

Dosage and Administration

STRICT ADHERENCE TO THE FOLLOWING IS REQUIRED FOR OPTIMUM RESULTS OF TREATMENT

1. Thoroughly Cleanse and Irrigate Wound Area with sterile water or water solutions. Wound MUST be cleansed of any antiseptics or heavy-metal antibacterials which may denature enzyme activity. Substrate characteristics (e.g., Hexachlorophene, Silver Nitrate, Benzalkonium Chloride, Nitrofurazone, etc.).
2. Thoroughly moisten wound area either through tubbing or wet soaks (e.g., sodium chloride or water solution).
3. Apply TRAVASE Ointment in a thin layer assuring in complete coverage of the wound and complete wound coverage 1/4 to 1/2 inch beyond the area to be debrided.
4. Apply loose wet dressings.
5. Repeat entire procedure 3 to 4 times per day for best results.

How Supplied

3P3002 TRAVASE Ointment is supplied sterile in one-half ounce (14.2 g.) containing 82,000 casein units of sutilains in a hydrophobic ointment base.

The ointment must be stored under refrigeration at 2° to 10° (35° to 50° F.).

References

1. Garrett, T. A. *Bacillus subtilis* protease, a new agent for wound care. Clin. Med. 76: 11-15, 1969.
2. Hesterberg, R. (Necrosis treatment on fermentative basis) dissertation from the Chirurgical Clinic of the University of Munich. Dissertation Printing: Charlotte Schoen, Munich, 1964. (Ger.)
3. Howes, E. L. The healing of the burn may be hindered by therapy. 20th Cong. Soc. Inter. Chir., Rome, Italy, September 1967.
4. Prytz, B., Connell, J. F., Jr., and Rousselot, L. M. *Bacillus subtilis* protease in the digestion of burn eschar. Clin. Pharmacol. Ther. 347-51, 1966.

*A casein unit is the amount of enzyme required to produce optical density at 275 mμ as that of a solution of 1.5 mcg. of casein after the enzyme has been incubated with 35 mg. of casein for one minute.



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	each tablet, capsule or 5 cc. teaspoonful of elixir (23% alcohol)	each Donnatal No. 2	each Extentab
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opine sulfate	0.0194 mg.	0.0194 mg.	0.0582 mg.
scopolamine hydrobromide	0.0065 mg.	0.0065 mg.	0.0195 mg.
phenobarbital	($\frac{1}{4}$ gr.) 16.2 mg	($\frac{1}{2}$ gr.) 32.4 mg.	($\frac{3}{4}$ gr.) 48.6 mg.
Warning: may be habit forming)			

Brief summary. Adverse Reactions: Blurring of vision, dry mouth, difficult urination, and flushing or dryness of the skin may occur on higher dosage levels, rarely on usual dosage. Contraindications: Glaucoma, renal or hepatic disease, obstructive uropathy (for example, bladder neck obstruction due to prostatic hypertrophy), or hypersensitivity to any of the ingredients.

A-H-ROBINS A H Robins Company, Richmond, Virginia 23220

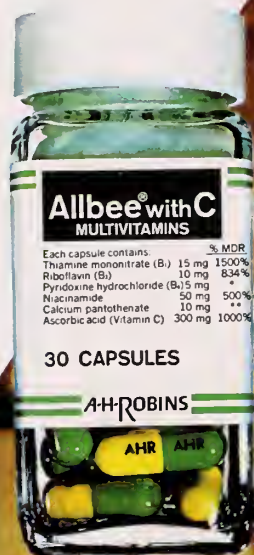
2 ways to provide a daily therapeutic supply of Vitamin C: 15 baked potatoes (skins and all!) or one capsule of Allbee® with C

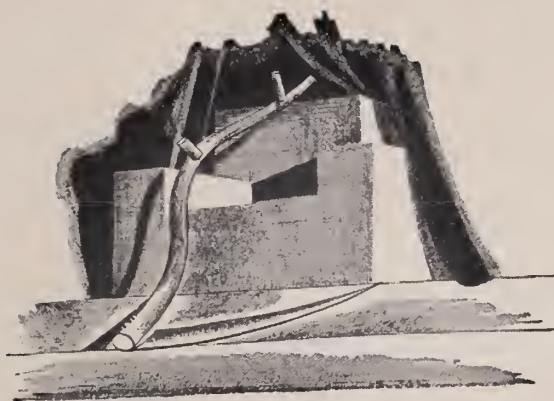
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A-H ROBINS





In Memoriam

ROBERT E. KOHLHASE, M.D.

Dr. Robert E. Kohlhasé, Minneapolis physician died March 7 at the age of 47. Born in New York City, Dr. Kohlhasé attended the University of Minnesota Medical School after his family moved to Minneapolis.

He was a member of the Hennepin County Medical Society, the Minnesota State Medical Association and the American Medical Association.

Dr. Kohlhasé is survived by his wife, Shirley, daughter Laura and three sons, Bruce, Brian and Mark.

RALPH T. KNIGHT, M.D.

Dr. Ralph Knight, 86, Minneapolis anesthesiologist, died October 20. He was the first faculty member of the University of Minnesota to devote himself to the full-time study of anesthesiology and served as Director of the Division of Anesthesia from 1920 to 1954, when he became Professor Emeritus. During this period he trained 123 resident physicians in anesthesiology.

Born and educated in Minneapolis, Dr. Knight was a member of the Minneapolis Surgical Society, American Society of Anesthetists, Hennepin County Medical Society and the American Medical Association. He was a Life and 50 Club Member of the Minnesota State Medical Association and a fellow of the American College of Surgeons.

Dr. Knight is survived by his wife, Clara, daughter Barbara and sons, James and Thomas. Dr. Roy R. Knight of Minneapolis is his brother.

GEORGE N. RUHBERG, M.D.

Dr. George W. Ruhberg, born in Grafton, North Dakota in 1893, died January 23, at his home in Santa Barbara, California. He had attended the University of Minnesota Medical School and practiced for 25 years in St. Paul as attending neuropsychiatrist at Ancker Hospital and Gillette State Hospital. Dr. Ruhberg was also assistant clinical professor of neurology and psychiatry at the University of Minnesota.

A past president of the Ramsey County Medical Society and the Central Neuropsychiatric Association, Dr. Ruhberg was also a charter member of the Hundred Club of St. Paul and a life member of the St. Paul Historical Society. He was a member of the American Medical Association and an Associate and 50 Club Mem-

ber of the Minnesota State Medical Association.

Dr. Ruhberg is survived by his wife, Gertrude, four daughters and a son.

PAUL F. MEYER, M.D.

Dr. Paul Meyer, 76, Faribault physician and surgeon, died February 13, in Tampa, Florida, while visiting his daughter there. He was born in Sedalia, Missouri, and in 1908 his family moved to Faribault. In 1925 he started the practice of medicine in Faribault and remained there for 48 years.

He was a member of the American Medical Association and the American Academy of Family Practice, a past president of the Rice County Medical Society and a Life and 50 Club Member of the Minnesota State Medical Association.

Dr. Meyer is survived by his wife, Dorothy, daughter Jan, and sons, Doctors Robert and Richard Meyer.

STUART WILLIAM HARRINGTON, M.D.

Dr. Stuart W. Harrington, 83, internationally known breast and lung surgeon at the Mayo Clinic, died March 7. He was also professor emeritus of surgery.

In 1912 as a member of the University of Pennsylvania football team, he was named to the Walter Camp All American Football Team.

He was a former president of the American Association for Thoracic Surgery, a member of the Zumbro Valley Medical Society and the American Medical Association and an Associate and 50 Club Member of the Minnesota State Medical Association.

Dr. Harrington is survived by his wife, Gertrude.

CHARLES J. HEDLUND, M.D.

Dr. Charles J. Hedlund, 63, of Tucson, Arizona, formerly of St. Paul, died February 15. A native of North Dakota and a graduate of the Washington University Medical School in St. Louis, Missouri, Dr. Hedlund had his hospital training at Ancker Hospital, St. Paul.

He was a member of the Ramsey County Medical Society, the American Medical Association and an Associate Member of the Minnesota State Medical Association.

Dr. Hedlund is survived by his wife, Nancy, and a son, Charles.

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Respiratory Assistance in the Newborn

MARTHA BURKE-STRICKLAND, M.D.*

WHEN THE RESPIRATORY system cannot cope with carbon dioxide produced in the body and cannot oxygenate the blood sufficiently to support aerobic metabolism needs of the body, hypoxia and hypercarbia develop and pulmonary insufficiency is said to exist. The sudden occurrence of severe hypoxia and hypercarbia is a true emergency which requires immediate assistance.^{1,2} The kind of assistance given depends on the reason for the respiratory failure and the degree of impairment present.

Although accurate assessment of alveolar ventilation requires measurement of blood pH, $p\text{CO}_2$ and $p\text{O}_2$,¹ a gross measure of pulmonary insufficiency may be obtained from the degree of cyanosis, tachypnea, retracting, grunting and lethargy. Relief of these signs is a rough measure of the effectiveness of assistance.

Respiratory Distress Syndrome (RDS) is a common cause of respiratory insufficiency in the newborn.³⁻⁶ Because of the variability in severity of respiratory insufficiency exhibited from case to case as well as the variability from hour to hour in any patient with RDS the physician must be prepared to offer several different kinds of treatment. This is a presentation of the criteria and

techniques used to treat RDS respiratory insufficiency at the Hennepin County General Hospital (HCGH).

Bag Assistance

In mild to moderate RDS, the infant will have characteristic tachypnea, seesaw respirations and some retracting. Reticulogranular pattern and air bronchograms extending beyond the hilar parenchyma are present on chest Xray but the heart silhouette is still clearly discernible.^{3,6,7} The cyanosis is relieved by increasing the ambient oxygen up to 40%. The blood pH may reflect a mild metabolic acidosis in the range of 7.27-7.37, a normal to slightly high $p\text{CO}_2$ at 40-45 mm Hg. The $p\text{O}_2$ will be in an acceptable range between 40-100 mm Hg since the ambient oxygen has been increased to relieve cyanosis. Intermittent short apneic episodes with some increased hypercarbia and hypoxia on the second or third day may signal tiring of the infant. Intermittent bagging with a hand resuscitator and mask may be all the extra assistance that is needed. The length of time and frequency of the bagging is determined by the response of the baby. Usually five minutes every 30-40 minutes is our starting point. If the color remains good and no more apnea occurs, this schedule is maintained. Blood pH and gas

*Director of Newborn Services, Hennepin County General Hospital, Minneapolis, Minnesota.
See editorial, page 409.

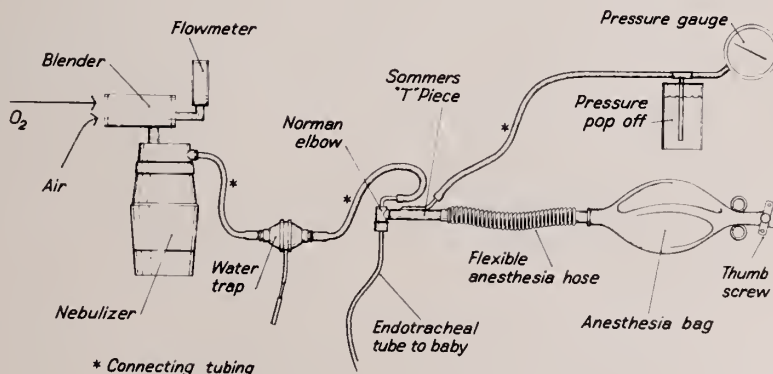


Fig. 1—Continuous Positive Airway Pressure (CPAP).

analysis before and after the bagging at least every four hours helps to determine the continuing need and the effectiveness of the assistance. The interval between baggings is lengthened if all values are normal before the bagging cycle is started. It is shortened if apnea or duskiness appear before time for the next scheduled period of assistance. If the baby is immediately dusky or apneic as soon as the bagging is stopped, or, if greater than 40% ambient oxygen is required to relieve the cyanosis, then continuous positive airway pressure (CPAP) should be instituted (Figure 1).

CPAP Technique

We are using the CPAP system described by Gregory, et al.⁸ The baby is intubated with a three mm endotracheal tube that will admit a #8F suction catheter. The endotracheal (ET) tube adapter is connected to an assembly which includes a Norman elbow, a Sommers "T" piece, an eight by 10" length of flexible anesthesia hose, a 500 cc pediatric anesthesia bag, a safety pressure relief valve and a pressure manometer. A controlled mixture of oxygen and air is delivered from a gas blender through a heated humidification chamber (set at 99°F) through a line to the Norman elbow. A water trap in the line prevents water condensate from drowning the patient.

The system pressure is regulated by a thumb screw pinch clamp on the tail port of the anesthesia bag. The system pressure is recorded by the manometer in the line from the Sommers "T" piece. This line also includes the safety pressure relief. The "T" tube in the line is submerged in water to a depth equal to the maximum number cm water pressure desired. A 30 cm setting is standard in our unit.

Removal of exhaled CO₂ from the system depends on wash out by flow of gas. The liter flow should be at least 2½ times the minute volume of the infant. Five liters per minute will handle the problem for most newborns.

A system pressure or end expiratory pressure of 10 cms is arbitrarily set as the beginning pressure and later readjusted according to the infant's response. If little or no improvement is shown, the pressure is increased up to a maximum setting of 17 cms water. If the infant improves, the oxygen concentration is decreased in 5% steps down to 40% or less. Then the pressure is decreased 1-2 mm at a time. The blood pH and gases are determined within 30 minutes after each

change. Changes are made at two hour interval as tolerated.

If the infant suddenly deteriorates, the setting are immediately restored to the point where he previously seemed stable. "Tolerance" is assessed by continued good color, respiratory drive and responsiveness of the infant with a stable pH of 7.25 or more, arterial pO₂ between 40 and 100 mm Hg and a pCO₂ of less than 70. If the pO₂ is marginal at 40, no decrease changes are made until the pO₂ moves toward the higher side of normal.

Frequent monitoring of blood gases and pH are essential to satisfactory assessment and management of this type of care. If these diagnostic services as well as knowledgeable nursing care are not available on a 24 hour basis, then the baby who needs more than 40% oxygen to relieve the cyanosis of his RDS should be transferred to a center that has such facilities.

Rationale of CPAP

CPAP helps the grunting hypoxic infant by substituting the system pressure for the grunting pressure of the baby. He still uses his own respiratory drive and does his own breathing, but the work of breathing is reduced. Areas of lung that were atelectatic and underventilated become expanded and have improved ventilation. By improving the distribution of ventilation to perfusion, the pO₂ will increase.⁸ With more alveoli being ventilated with less energy expenditure there is less CO₂ production, better oxygenation and a readjustment of the pH toward normal.^{1,8}

Any existing metabolic acidosis should be corrected with bicarbonate therapy. The improvement in oxygenation will minimize further generation of metabolic hydrogen ions.

A rapid reduction in ambient oxygen necessary to maintain the baby usually occurs within hours after CPAP is started.⁸ This obviously reduces the risk of Bronchopulmonary Dysplasia (BPD).

When CPAP is Not Enough

There are circumstances when CPAP is not enough. When the lung parenchyma becomes badly involved, the compliance is greatly reduced. The inspiratory effort required to fill the lung (over and above the functional residual capacity being maintained by CPAP) may become too much for the infant. In this situation, CPAP is

combined with a respirator. This type of ventilation assistance is known as continuous positive pressure breathing (CPPB).

Rationale of CPPB

In CPPB, the mechanism of help from the end expiratory pressure is the same as with CPAP assistance, the difference is that now the respirator assumes the entire work load of breathing. Again, many more alveoli can be ventilated with each breath than could be with the baby's weak unassisted efforts.

CPPB Technique

Many respirators can be adapted to deliver this kind of ventilation assistance. A modification of the PR-2 special has proven satisfactory in our unit. Instead of the standard manifold, one with a spirometer side arm is used. The positive end expiratory pressure (PEEP) line is attached to the side arm. This system differs from CPAP in that the system pressure is set by submerging the inline tube to the desired depth in water. Since the venturi system of the PR-2 depends on a drop in pressure for cycling, it is necessary to interpose a one-way valve in the respirator hose so the respirator head will not "feel" the back pressure of the PEEP (Figure 2).

This system is extremely effective when properly assembled. It is very sensitive to air leaks and will not hold the end pressure if there is a leak *anywhere*. Another common problem is reversal of the one-way valve. The respirator cycles merrily on but *no* ventilation reaches the baby. This is most likely to occur during the daily

change of all equipment necessary to control infection. If the baby's condition is severe enough to need CPPB, then he cannot tolerate even a few minutes without it. The personnel must be thoroughly conversant with the setup and know how to troubleshoot problems within seconds, not minutes or hours.

Effectiveness of CPPB

Diffusion of gases across a membrane depends on surface area, concentration of the gases on each side of the membrane and characteristics of the membrane including its thickness.¹⁰ It is well known that one of the main factors limiting viability of the human fetus is maturity of lung function. Surface area of the membrane, i.e., the number of functional alveoli present at a given gestational age and thickness of the membrane, i.e., juxtaposition of the capillary to the alveolar surface, do not reach a maturity that will ordinarily be expected to support life until 26-28 weeks gestation.² Even at this gestational age the 800 gram infant has a tough go of it. A 17-week-old fetus has few if any alveoli, only bronchioles, therefore, it seemed reasonable to assume that if CPPB could ventilate such an immature fetus, it could be expected to ventilate almost anything in the lungs. The first Xray taken within minutes after birth showed complete opacification of a 340 gram infant's chest. The blood pH was 6.74, $p\text{CO}_2$ 110 and $p\text{O}_2$ 20 on 100% oxygen. Fifteen minutes after birth 1.5 mEq NaHCO_3 was given by slow push and CPAP with 100% O_2 was initiated. After 30 minutes the values were as follows: pH 6.95, $p\text{CO}_2$ 90 and $p\text{O}_2$ 49. This was

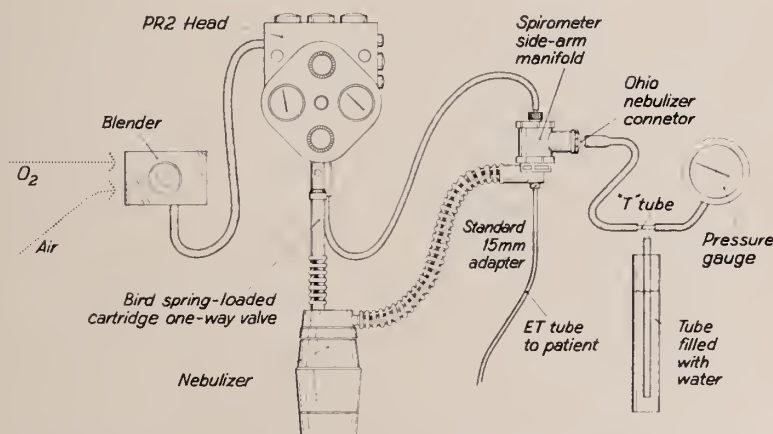


Fig. 2—PR₂ system modified for Continuous Positive Pressure Breathing (CPPB).

improvement in the right direction but still not adequate in circumstances where the infant is really considered salvageable. Significantly, the baby was able to initiate and sustain respirations with CPAP. Ventilation was changed to CPPB. After another 30 minutes, the pH was 7.41, $p\text{CO}_2$ 38 and $p\text{O}_2$ 45. The respirator was turned off because the baby was losing her skin. She was so friable that every area touched became ecchymotic. Within a short period the thin skin would drop away leaving a raw, hemorrhagic surface. At autopsy the lungs were not hemorrhagic in spite of ET tube manipulation and respirator expansion. Microscopic sections of the lung confirmed the state of immaturity as approximately 17 weeks gestation. The "membrane" was quite thick across which the ventilation was forced. It is *not* suggested that a mass effort be made to save 340 gram abortions. This is presented to emphasize the effectiveness of this method of ventilation under very adverse circumstances.

Complications of CPAP and CPPB

Pneumomediastinum and Pneumothorax

There is an increased incidence of pneumomediastinum and pneumothorax in intubated neonates¹¹ though any newborn infant may have spontaneous rupture with extravasation and dissection of gases through the tissues and into pleural spaces.¹² When extra system pressure is added, the risk may be increased. This is particularly true in the very severely involved infant on CPPB when respiring pressures of 40-50 cms of water are used to overcome the poor compliance of the lung. This is always a calculated risk that is taken for the baby since he will surely die without it. When tension pneumothorax is present, it is treated by tube thoracostomy.

Massive Air Embolism

This can occur with IPPB as well as CPPB when high pressures are used. Apparently large amounts of gas are forced into the pulmonary veins and embolize to the heart. This is not related to manipulation of the umbilical catheters with accidental air embolization along this route. Dr. Tooley, et al., reported such a case in 1969.¹³ We have had one case in ten years experience with respirator assistance of severe RDS.

Pulmonary Edema and Heart Failure

According to Gregory, et al., only 20% of the airway pressure is transmitted as intrathoracic pressure. However, it is possible that, as the lung

improves and becomes more compliant, the intrathoracic pressure rises causing a drop in cardiac output.⁸ In our experience, the infant who requires high end pressure and high respiring pressure of CPPB develops signs of cor pulmonale. The cardiac failure usually responds to digitalization. This is discontinued when the infant no longer requires assistance.

Hypercarbia

After application of end expiratory pressure, some relatively normal areas of lung may have higher volume at end-expiration and therefore have less total ventilation. As the lung improves it is possible to cause CO_2 retention unless the end pressure is lowered rapidly as outlined above. In other words, CPAP or CPPB help when the conditions are right to need it; it can be harmful when no longer needed. Continual assessment and readjustment of settings are necessary if a good outcome is to be obtained.

Bronchopulmonary Dysplasia (BPD)

Bronchopulmonary dysplasia can occur with CPAP and CPPB though the risks have been minimized compared to therapy without CPAP or CPPB. This is thought to be a complication of oxygen therapy, however, some believe that it is a combination of oxygen, intubation and respirator therapy.^{7,14,16} It is our impression that it is oxygen toxicity superimposed upon any underlying lung pathology.

The longer the tracheobronchial mucosa is subjected to an ambient O_2 as high as 80%, the more likely the development of bronchopulmonary dysplasia.^{7,14,15} Studies at HCGH have shown that effects of oxygen toxicity are often apparent after 20 hours of such therapy and invariably present after 30 hours of exposure to high ambient oxygen.^{7,15} If the infant can be sustained through the emergency, the lungs should be able to repair in most instances.^{14,17,18} Criteria are not yet available to determine when toxicity damage is irreversible, therefore, management of respiratory distress should try to minimize the risk from BPD as much as possible.

The cases with the most severely damaged lungs are the ones that require CPPB and are therefore, most vulnerable to severe BPD. Management of BPD includes control of cor pulmonale, prevention of chronic low grade hypoxia and attention to bronchial toilet. The infant may require low ambient oxygen (25-30%) for six to

eight weeks until the lungs gradually improve. The metaplastic process involves the mucous glands as well as loss of the normal ciliated columnar epithelium lining the trachea and bronchi. Excessively viscid secretions in the trachea and bronchi are poorly handled. A high humidity environment, intermittent nebulization, postural drainage and chest thumping are used to facilitate removal of secretions and maintain bronchial toilet.

Infection

Prolonged invasion of a body orifice may predispose to infection. The use of CPAP and CPPB seems to reduce the length of time that intubation is required, however, any use of the endotracheal tube in a lung that is already compromised may be complicated by infection. Scrupulous hand-washing care, good suctioning technique and changing of inhalation equipment daily with gas sterilization of equipment between uses has reduced bacterial complications in our unit. Daily cultures are made of tracheal aspirates. Appropriate antibiotic therapy is started if positive cultures correlate with deteriorating change in the infant's condition.

The incidence of systemic candidiasis has been sharply reduced in our unit by using prophylactic nystatin in the baby's mouth 100,000 units every six hours. It is conjectured that placement of the orotracheal tube interferes with the normal mechanical cleansing action of the tongue movements and the process of swallowing. This increases the chances for seeding the oral mucosa with ubiquitous candida. A debilitated infant is more vulnerable to systemic invasion by the organism from this focal point. Prevention has

proven more satisfactory than salvage after systemic candida has been documented.

Intermittent Positive Pressure Breathing

Intermittent Positive Pressure Breathing (IPPB) still has a place in our spectrum of support for the respiratory failure of the newborn. When the causes for failure are extrapulmonary, for example in drug depression, it is easy to over ventilate the normal lung. In these cases there is no need for CPPB, in fact it may decrease ventilation as described above and CPAP cannot be used without normal respiratory drive. IPPB serves these patients very well.

Since it is an easier mechanism to transport than CPPB, it can also be used for emergency care during transfer of a sick infant. Some units are using the CPAP and CPPB without the safety relief valve. This improves the portability of these systems but may also account for the increased incidence of pneumothorax that has been informally reported through personal communications.

Summary

Varying degrees of respiratory insufficiency in the newborn are exemplified by the variability found in RDS. Respiratory support ranges from increased ambient oxygen in very mild cases through continuous positive pressure breathing in the most severe. In each situation frequent monitoring and knowledgeable nursing care are required for a good outcome. With the newer methods of assistance (CPAP and CPPB) it is possible to salvage intact individuals with fewer long term pulmonary sequelae.

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The People Problem

At one of the many meetings last year of the Minnesota State Medical Association's Subcommittee on Alcoholism and Drug Abuse, Dr. Allan Y. Cohen, a guest from the John F. Kennedy University, Berkeley, pointed out the common tendency to consider that there is something terribly wrong, either psychologically or morally, with the drug abuser. That notion often results in a philosophy of social intervention which is reactive and negative. Cohen argues for the use instead of what he calls the "Alternatives Model." He emphasizes the following seven principles:

1. People use drugs because they want to.
2. People use drugs to feel better or to "get high," or they experiment in using drugs out of curiosity or in the hope that they will feel better.
3. People have been and are currently being taught by the media and by broad cultural example that drugs *do* make them feel better.
4. "Feeling better" encompasses a wide range of change in mood or consciousness.
5. While people may well for a time feel better with the use of many mind-altering or mood-altering drugs, drugs may have substantial disadvantages.
6. Generally, people do not stop using drugs until or unless they discover—or are shown—something better.
7. The "key," then, to dealing with people who are abusing or misusing drugs is to focus on the "something better" and, as Dr. Cohen puts it, to "maximize opportunities for experiencing satisfying non-chemical alternatives."¹

He has a lot to say about specific applications of this "Alternatives Model," and those applications are many. To consider just one: it is rather widely accepted that our schools may, through rigidity, inappropriate priorities and irrelevance, themselves contribute to the dissatisfactions which lead children to use mind-altering or mood-altering drugs. Schools may be good at transmitting facts, but poor in helping the student to develop an appropriate "art of living." Cohen points out that one reason for this may be that, while most schools offer courses in such things as music, art, drama, family life education, manual training and physical education, they use in those courses an arbitrary grading scheme which brings to them the same anxieties and destructive feelings of competition which the student finds in the so-called "intellective" courses. He suggests that abolition of grades in such "alternative" subjects might be a significant help in turning youngsters onto a natural "high."

Grade-conscious parents should note that young people as well as older people tend to be attracted to the comfortable and repulsed by the uncomfortable. An "F," or even the threat of an "F," is clearly uncomfortable, and there seems little need for that kind of discomfort in areas of activity which just might get young people so deeply and enthusiastically involved that drugs would not seem comparably inviting.

This seems to make a lot of sense, with its emphasis on the person. No drug is a problem until or unless someone uses it. The "drug problem" is really a "people problem."

Robert Bjornson, M.D.
St. Paul, Minnesota

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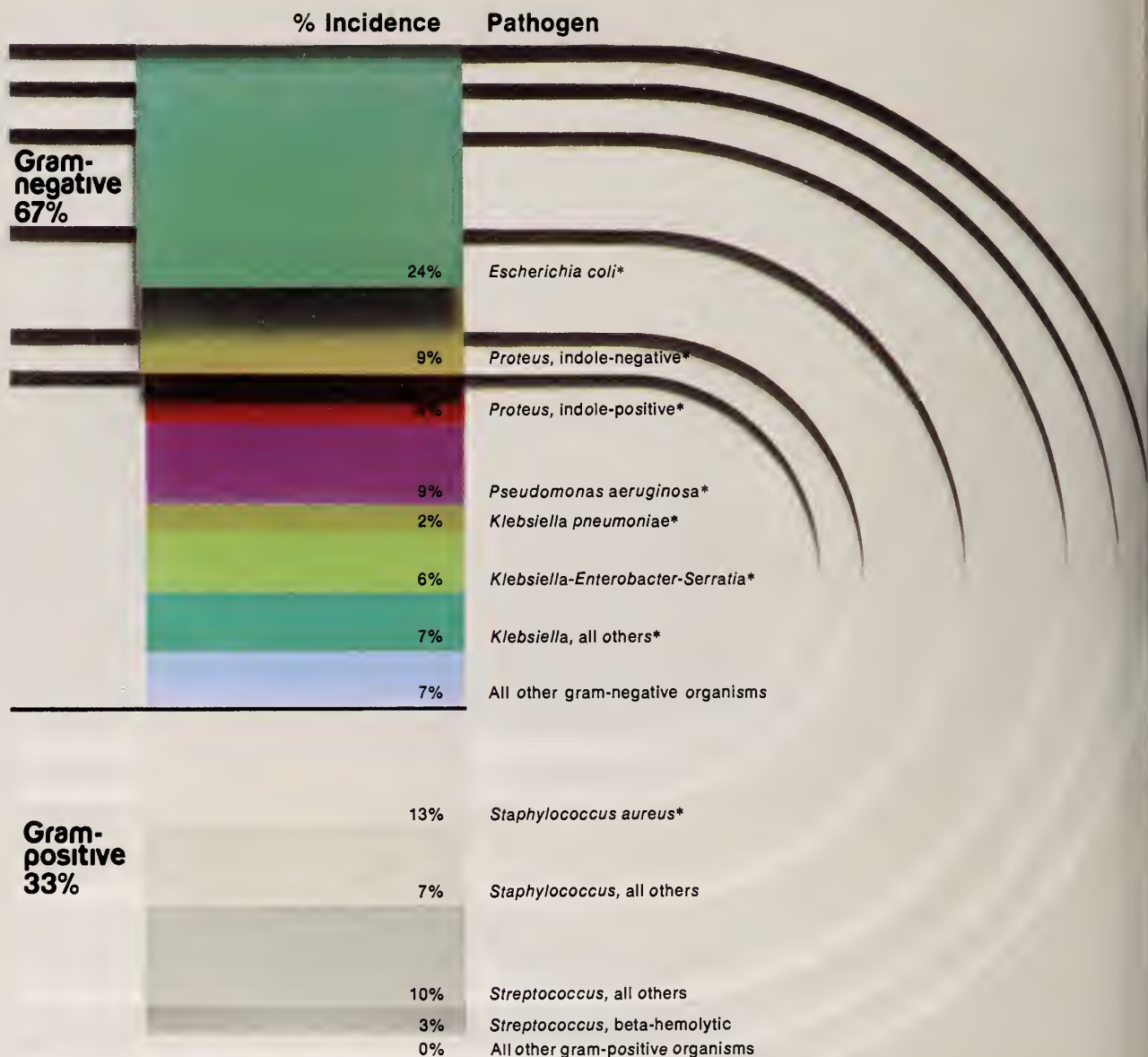
On all in-patient
services...

a major problem

2 out of 3
nosocomial infections
are gram-negative



Commonly encountered pathogens on all hospital services



Total pathogens 21,972
Source: Gosselin Audit of Pathology Cultures—1971

*GARAMYCIN Injectable is effective against susceptible strains of the pathogens indicated

Highly appropriate spectrum for today's problem pathogens

GARAMYCIN Injectable offers a high probability of effectiveness against susceptible strains of seven out of seven major gram-negative pathogens. These are:

Escherichia coli
Proteus, indole-negative
Proteus, indole-positive
Pseudomonas aeruginosa
Klebsiella
Enterobacter } species
Serratia

GARAMYCIN Injectable has also been shown effective in serious staphylococcal infection. It may be considered in those infections where penicillins or other less potentially toxic drugs are contraindicated and bacterial susceptibility testing and clinical judgment indicate its use.



serious gram-negative infections (pneumonia, urinary tract infections, septicemia, and wound infections)*
 *susceptible organisms

Start with Garamycin

■ Broad gram-negative spectrum

Because of its broad gram-negative spectrum and its well-established clinical efficacy, GARAMYCIN Injectable can be considered for initial therapy in suspected as well as documented gram-negative sepsis.

Stay with Garamycin

■ Susceptibility of causative organisms confirmed

The results of susceptibility tests will, in most cases, demonstrate the causative organisms' sensitivity to GARAMYCIN Injectable. However, the decision to continue therapy with this drug should also be based on the severity of the infection and the important additional concepts contained in the Warning Box.

■ Relatively low incidence of adverse reactions

Risk of toxic reactions is low in patients with normal renal function who do not receive GARAMYCIN Injectable at higher doses or for longer periods of time than recommended.

■ Bacterial resistance has not been a problem

In the laboratory, resistance has been demonstrated to develop slowly in stepwise fashion. No one-step mutations to high resistance have been reported to date.

On all in-patient services...

Garamycin[®]

gentamicin sulfate

injectable

I.M./I.V.

40 mg. per cc.

Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin

WARNING

Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug. Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal impairment, treated with GARAMYCIN Injectable, usually in longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment.

Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at the onset of therapy who develop evidence of nitrogen retention (increasing BUN, NPN, creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments

or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, neomycin, kanamycin, cephaloridine, viomycin, polymyxin B, and polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent diuretics should be avoided, since certain diuretics by themselves may cause ototoxicity. In addition, when administered intravenously, diuretics may cause a rise in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy has not been established.

On all in-patient services...
in hospital-acquired gram-negative infections*

Garamycin[®]

gentamicin sulfate

Injectable

I.M./I.V.

Also available:
GARAMYCIN[®] Pediatric Injectable, 10 mg. per cc.

40 mg. per cc.
Each cc. contains
gentamicin sulfate equivalent
to 40 mg. gentamicin

GARAMYCIN[®] Injectable, brand of gentamicin sulfate U.S.P., injection, 40 mg./cc. Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin
For Parenteral Administration

WARNING

Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug.

Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal damage, treated with GARAMYCIN Injectable, usually for longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment.

Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at onset of therapy who develop evidence of nitrogen retention (increasing BUN, NPN, creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, neomycin, kanamycin, cephaloridine, viomycin, polymyxin B, and polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent diuretics should be avoided, since certain diuretics by themselves may cause ototoxicity. In addition, when administered intravenously, diuretics may cause a rise in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy has not been established.

INDICATIONS GARAMYCIN Injectable is indicated, with due regard for relative toxicity of antibiotics, in the treatment of serious infections caused by susceptible strains of the following microorganisms:

Pseudomonas aeruginosa, **Proteus** species (indole-positive and indole-negative), **Escherichia coli** and **Klebsiella-Enterobacter-Serratia** species.

Clinical studies have shown GARAMYCIN Injectable to be effective in septicemia and serious infections of the central nervous system (meningitis), urinary tract, respiratory tract, gastrointestinal tract, skin and soft tissue (including burns).

Bacteriologic tests to determine the causative organisms and their susceptibility to gentamicin should be performed.

Bacterial resistance to gentamicin develops slowly in stepwise fashion; there have been no one-step mutations to high resistance.

In suspected or documented gram-negative sepsis, GARAMYCIN may be considered as initial therapy. The decision to continue therapy with this drug should be based on the results of susceptibility tests, the severity of the infection, and the important additional concepts contained in the Warning Box. In the neonate with suspected sepsis or staphylococcal pneumonia, a penicillin type drug is usually indicated as concomitant antimicrobial therapy.

GARAMYCIN Injectable has been shown to be effective in serious staphylococcal infections. It may be considered in those infections when penicillins or other less potentially toxic drugs are contraindicated and bacterial susceptibility testing and clinical judgment indicate its use.

CONTRAINDICATIONS A history of hypersensitivity to gentamicin is a contraindication to its use.

WARNINGS See Warning Box.

PRECAUTIONS Neuromuscular blockade and respiratory paralysis have been reported in the cat receiving high doses (40 mg./kg.) of gentamicin. The possibility of these phenomena occurring in man should be considered if gentamicin is administered to patients receiving neuromuscular blocking agents such as succinylcholine and tubocurarine.

Treatment with gentamicin may result in overgrowth of nonsusceptible organisms. If this occurs, appropriate therapy is indicated.

ADVERSE REACTIONS

Nephrotoxicity: Adverse renal effects, as demonstrated by rising BUN, NPN, serum creatinine and oliguria, have been reported. They occur more frequently in patients with a history of renal impairment treated with larger than recommended dosage.

Neurotoxicity: Adverse effects on both vestibular and auditory branches of the eighth nerve have been reported in patients on high dosage and/or prolonged therapy. Symptoms include dizziness, vertigo, tinnitus, roaring in the ears and hearing loss. Numbness, skin tingling, muscle twitching, and convulsions have also been reported.

Note: The risk of toxic reactions is low in patients with normal renal function who do not receive GARAMYCIN Injectable at higher doses or for longer periods of time than recommended.

Other reported adverse reactions, possibly related to gentamicin, include increased serum transaminase (SGOT, SGPT), increased serum bilirubin, transient hepatomegaly, decreased serum calcium; splenomegaly, anemia, increased and decreased reticulocyte counts, granulocytopenia, thrombocytopenia, purpura; fever, rash, itching, urticaria, generalized burning, joint pain, laryngeal edema; nausea, vomiting, headache, increased salivation, lethargy and decreased appetite, weight loss, pulmonary fibrosis, hypotension and hypertension.

DOSAGE AND ADMINISTRATION

GARAMYCIN Injectable may be given intramuscularly or intravenously.

For Intramuscular Administration:

PATIENTS WITH NORMAL RENAL FUNCTION*

Adults: The recommended dosage for GARAMYCIN Injectable for patients with serious infections and normal renal function is 3 mg./kg./day, administered in three equal doses every 8 hours.

For patients weighing over 60 kg. (132 lb.), the usual dosage is 80 mg. (2 cc.) three times daily. For patients weighing 60 kg. (132 lb.) or less, the

usual dose is 60 mg. (1.5 cc.) three times daily.

In patients with life-threatening infections, dosages up to 5 mg./kg./day may be administered in three or four equal doses. This dosage should be reduced to 3 mg./kg./day as soon as clinically indicated.

*In children and infants, the newborn, and patients with impaired renal function, dosage must be adjusted in accordance with instructions set forth in the Package Insert.

For Intravenous Administration:

The intravenous administration of GARAMYCIN Injectable is recommended in those circumstances when the intramuscular route is not feasible (e.g., patients in shock, with hematologic disorders, with severe burns, or with reduced muscle mass).

For intravenous administration, in adults, a single dose of GARAMYCIN Injectable may be diluted in 100 or 200 cc. of sterile normal saline or in a sterile solution of dextrose 5% in water; in infants and children, the volume of diluent should be less. The concentration of gentamicin in solution, in both instances should normally not exceed 1 mg./cc. (0.1%). The solution is infused over a period of 1 to 2 hours.

The recommended dose for intravenous administration is identical to that recommended for intramuscular use.

GARAMYCIN Injectable should not be physically pre-mixed with other drugs, but should be administered separately in accordance with the recommended route of administration and dosage schedule.

HOW SUPPLIED GARAMYCIN Injectable, 40 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

Also available, GARAMYCIN Pediatric Injectable 10 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

APRIL, 19

For more complete prescribing details, consult Package Insert or Physicians' Desk Reference. Schering literature is also available from your Schering Representative or Professional Service Department, Schering Corporation, Kenilworth, New Jersey 07033.

*Due to susceptible organisms

Rehabilitation after Myocardial Infarction

JOHN W. ANDERSON, M.D.*

DURING THE past three years all Blue Earth United Hospital patients suspected of having an acute myocardial infarction were admitted immediately to the intensive coronary care unit (ICCU). The details of this unit have been described elsewhere.⁴ Patients were encouraged to engage in all forms of tolerable activity, the only restrictions being those compelled by a continuous intravenous pathway and the attachments of a cardiac monitoring cable. Self care, use of the bedside commode and bathroom, meals in the chair instead of bed, and frequent walks around the room and into the adjoining hall were the rule. Patients were transferred out of the ICCU when they no longer displayed risk of significant dysrhythmias and were ambulatory without significant chest pain or dyspnea. The average length of ICCU stay was five days, the longest was 13 days.

Selected literature was given to the patients to educate them regarding their coronary artery disease, with particular emphasis on the importance of diet, recreational exercise and avoidance of emotional tension and smoking. Sessions were arranged between the patient, his family and the dietitian. After transfer out of the ICCU the patients were rapidly returned to full activity by daily increases in the frequency, and duration of their walks in the hospital halls, with chest pain being the chief limiting factor. The goal was to have the patients walking outside the building for brief strolls before discharge. The average length of hospital stay for the patients was 15.3 days.

After discharge patients were instructed to engage in daily increases in their walking out-of-doors and were encouraged to walk slightly beyond the onset of chest pain. They were advised to buy pedometers to record their walking distances

to encourage and document their progress. Golfing, hunting and fishing were encouraged. Early return to their gainful employment was advocated. Travel of all types and to all places was advised if such travel allowed continuation of their daily recreational exercise programs.^{5,6,7,8}

Various medications to include digitalis, propranolol, anticoagulants, anti-hyperlipidemics, anti-hypertensives, diuretics, etc. were, of course, employed as indicated, but in most instances it was made clear to the patients that these measures were of secondary value as compared to the importance of diet, recreational exercise, emotional relaxation and cessation of smoking.

All patients were followed by regular out-patient visits and advised to submit to annual comprehensive medical re-evaluation. Stress-testing, employing the bicycle exerciser, was used in some instances.

Some patients did not show improvement in their cardiac function with this program and were referred for evaluation regarding coronary angiography and possible coronary artery surgery. Three patients have had surgery. All are alive.

The majority of patients managed in this way improved rapidly, often dramatically. They frequently became much more tolerant of exercise and experienced less and sometimes no angina as compared to their pre-infarction period. There was usually a general increase in their sense of well-being.

The Study

All patients with a final diagnosis of acute myocardial infarction at the United Hospital of Blue Earth, Minnesota during 1968, 1969 and 1970 were reviewed as of June 30, 1971. Patients in the study had been followed from six months to three and a half years, the average length of follow-up being two years. The diagnostic criteria for a myocardial infarction were: (1) a history of typical pain (2) sequential changes in the electrocardiogram, and (3) a changing elevation of at least

*General staff of the United Hospital, Blue Earth, Minnesota and Assistant Clinical Professor, Department of Family Practice, University of Minnesota Medical School.

Read at the annual meeting of the Southern Minnesota Medical Association on September 18, 1971.

This study was supported by the Blue Earth Medical Center, Blue Earth, Minnesota.

Reprint requests to 117 West 5th St., Blue Earth, Minnesota 56013 (Dr. Anderson).

CORONARY CARE

TABLE
Deaths in 103 Acute Myocardial Infarctions

	No. of Cases	Deaths In Unit	Deaths In Hosp. Out of Unit	Total Alive At Disch.	Deaths After Disch.	Total Alive 6-30-71	Total Deaths 6-30-71
1968	33	4	2	27	4	23	10
1969	33	4	2	27	7	20	13
1970	37	3	1	33	3	30	7
Totals	103	11	5	87	14	73	30

one of three serum enzymes: CPK, SGOT and LDH. It was found that a total of 103 cases of acute myocardial infarction by these criteria were admitted to the hospital during the three-year period. Eighty-six with probable infarction were admitted in the same three year period but did not meet the criteria and were excluded from this study. The author was either the attending or consulting physician for all cases. No patients were lost to follow-up.

Results

Seventy-three of the 103 patients diagnosed acute myocardial infarction were alive June 30,

1971, a 70% two-year average survival (Table

Of the 30 deaths 16 occurred during hospitalization for the acute infarction, 11 in the ICU and five after transfer out of the ICU. Eighty-seven of the 103 patients were discharged from the hospital alive and these patients have experienced an 84% two-year average survival since their discharge.

Of those patients who expired after discharge the earliest death was after one week and the latest was after 27 months with the average interval between infarction and death being eight months.

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As *Sickness* is the greatest misery, so the greatest misery of sickness, is *solitude*; when the infectiousness of the disease deters them who should assist, from coming. Even the *Physician* dares scarce come. . . . It is an *excuse* to them that are *great*, and pretend, and yet are loth to come; it is an *inhibition* to those who would truly come, because they may be made instruments, and pestilential to the infection of others, by their coming. And it is an *Outlawry*, and *Excommunication* upon the *Patient*, and separates him from all offices not only of *Civility*, but of working *Charity*. A long sickness will weary friends at last, but a pestilential sickness averts them from the beginning.*

*John Donne: Devotions upon Emergent Occasions, 1624.

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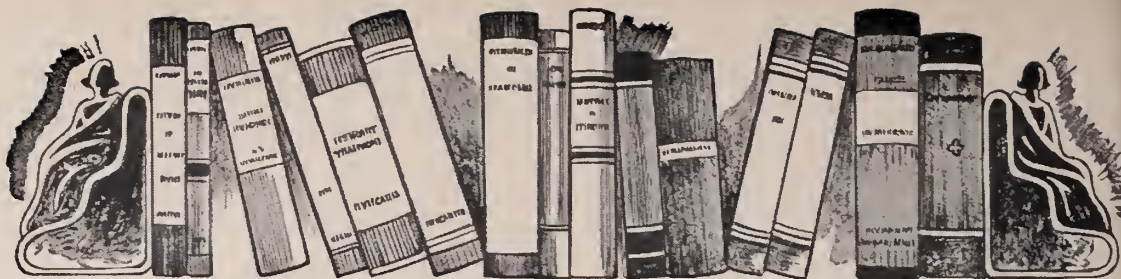
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Book Reviews

BLOOD DISEASES OF INFANCY AND CHILDHOOD. Carl H. Smith and Dennis R. Miller. 1972. 820 pages. 3rd Edition. \$29.75. C. V. Mosby Company, St. Louis, Missouri.

The "bible of pediatric hematology" has happily been republished in a new edition. Extensively re-written under the auspices of Doctor Smith, it again is an essential book for the hematologist and for those concerned with or interested in the blood problems of the child. Unfortunately, the untimely death of Doctor Smith might have been the undoing of this fine text, but luckily Doctor Miller beautifully completed the editing and final touches to this volume.

The area of pediatric hematology has grown by tremendous strides since the last edition in 1966. The new volume brilliantly reflects this growth in its exhaustive presentation of new materials. Chapters have been re-written with recent research and clinical findings blended with important materials of the second edition. The bibliography has been updated to include references through 1971. Although the text has grown from 742 to 820 pages, it remains easily readable and well indexed.

Newer discussions in areas including sickle cell treatment and physiology, advances in other hemoglobinopathies, 2-3 DPG, leukocyte function and tests of such, and immunotherapy possibilities in leukemia are well done. Updated chapters including leukopenic syndromes, purpuras, jaundice, and blood abnormalities in the infant are excellent. Re-emphasis of areas of normal cellular function, growth, and development are good in the formation of the ground work of hematology.

Areas of deficiency are few and of not major proportion. Undue emphasis on usage of steroids in hemophilia is unproven and lengthy explanation of plasma treatment is outdated. A reference to the value of australia antigen as a diagnostic aid in leukemia is questionable. The book unfortunately continues the legacy of other hematology texts in not providing morphological illustrations for the reader to utilize. Although the illustrations have been increased from 85 to 175, color plates have only gone from one to three (including a picture of measles in leukemia).

The book is excellent once again and is a necessary reference text. The bibliography provides a marvelous jumping off point. The publication will remain a lasting memorial and a just tribute to Doctor Carl H. Smith.

Lawrence J. Singher, M.D.
Minneapolis, Minnesota

COMMUNICABLE AND INFECTIOUS DISEASES, seventh edition by Franklin H. Top, Sr. and Paul F. Wehrle. The C. V. Mosby Company, St. Louis, 1972. Price \$35.

The seventh edition of this volume continues in the superb tradition of its predecessors. Paul Wehrle has joined Franklin Top as a co-editor, and they head a list of 57 distinguished contributors. The editors have added

new sections on Cholera, Cryptococcosis, Cytomegalovirus Infections, Exanthema Subitum, Erythema Infectiosum, Herpes Simplex, Larva Migrans and Plaque, bringing the number of chapters to 68. The format of this edition is similar to that of past volumes: several chapters in the first 100 pages dealing with general topics: infection, immunity, epidemiology, prevention and the study of infections followed by an alphabetical parade of individual chapters dealing with specific etiologic agents or clinical infectious entities. Individual chapters are general both complete and readable. The subject matter does not cover the entire spectrum of infectious diseases; for example, there is no coverage of such general topics as bacteremia (septicemia), urinary tract infection, endocarditis, osteomyelitis and other non-communicable infections. If one desires information on communicable infectious entities, then one finds impressive coverage. In that context, such general topics as bacterial pneumonias, acute respiratory infections, meningitis, infectious encephalitis, etc., are well covered. There is comprehensive coverage of the specific single agent etiologic infections such as chicken pox, hepatitis, staphylococcal infections, etc. This book is a pertinent reference to which physicians can turn with confidence, and should be a valuable asset in any library.

John M. Matsen, M.D.
Minneapolis, Minnesota

THE EXPECTANT FATHER: A PRACTICAL GUIDE 1972. 167 pp. Paperback \$1.95.

by George Schaefer. Harper and Row Second Edition

The only thing in "The Expectant Father" that referred to the father was the title, which suggested that it might be humorous. I found it dead serious and am surprised that it went into a second edition.

It is so long ago that I was a father that even thinking about being one again gives me a nauseous feeling in the belly and a pain in the area that has been misnamed merely because years ago it sat on a donkey and was commanded to get off. I thank thee, nevertheless.

I hope you have not forgotten my specialty—surgery—breast surgery—bilateral; which reminds me of the story about the Quaker who had a valuable milk cow. He was milking her when she swished her dirty tail in his face. He spoke to his cow and said:

"Dinah, thou knowest that I am a righteous Quaker and slow to anger. Swish not thy tail in mine eyes and face."

Dinah understood not a word and swished her tail again.

"Dinah, thou hast always been a faithful and obedient cow, but if thou swishest thy tail in the face of thine owner again, he will have to sell thee to a good doctor and he, I hope thou knowest, will kick the hell out of thee."

Carl O. Rice, M.D.
Editor Emeritus

Research in Family Medicine

JOHN E. VERBY, M.D.*

SYSTEMATIC INVESTIGATION of family medicine in its infancy in the U.S.A. It is not part of the undergraduate effort in most medical schools. The natural history of common but serious illnesses and the incidence of psychiatric problems in family medicine have never been accurately determined.

Subjects suitable for research include family studies of morbidity and prevention of disease, genetic information on common diseases, health services research of consumers' needs, health and illness behavior, effects of health education on prevention of disease, cost benefit ratios, use of health services by a defined population, behavioral aspects of doctor-patient-family relationships, and followup studies on therapy and educational efforts for patients and health care professionals. These will have to await a more complete development of sophisticated and true documentation of our populations' disease and health data, its storage, retrieval, and evaluation.

The most significant research that must be undertaken immediately is that of finding the most effective and efficient way of re-educating the general population, physicians, and other health professionals to extract and document the information necessary for creatively solving family health problems. I believe that individual health care needs will be based on family needs in the communities where families live, work, and play. If this be true, we have made a serious mistake by diligently working on the biomedical electron microscope style of research in medical education, while ignoring the need for research in effective and efficient health and disease care delivery to the people here and now!!

While we have gone to the moon and studied the mitochondria of the cell, we have not begun to develop ways of modifying human behavior for the benefit of the individual, families and human population. We must do this research and find ways to effectively apply this knowledge.

We have assumed that practicing physicians consistently extract valid information from patients. This is presumptuous. Physicians have not been trained in undergraduate and graduate work that allows them to interview patients efficiently and proficiently to develop techniques and skills that will allow patients to express and project their true feelings. A great majority of the patients coming to physicians' offices at times will deny and hide their true feelings, attitudes, and thoughts from the physician. The development of rapport, confidence, loyalty and trust between patient and doctor is extremely important if there is to be creative problem solving by both the patient and the physician. Many times this involves working with the family, *not* just the patient!

Proper interview techniques demand experience, training, skills, knowledge, and proper attitudes on the part of the physician. Today's physicians have been trained in general biological knowledge leading to the diagnosis of biological diseases. Today's family physician *must* have the appropriate skills, attitudes and knowledge to solve sociological, psychological and cultural problems as well as biological problems. This phase of education has been almost entirely neglected by medical educators both in the undergraduate training program and the graduate training program. Only in the last few years has any concerted effort been made to utilize audiovisual tapes and other equipment to educate student physicians in methods for properly extracting and evolving appropriate information from their patients and families. A great deal of research is essential to improve this most important technique for all clinicians and physicians caring for patients.

What really is the true incidence and natural history of psychological and sociological diseases? I do not think anyone knows this at this time. In view of the extreme mobility of people, centralized documentation of medical information on all citizens of the world becomes almost mandatory. Without proper techniques for collecting and random retrieving this information, the true incidence of biological, psychological, and sociological dis-

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eases may not appear.

A physician should have the ability to interpret non-verbal communications given by patients. Many diagnoses are made on the basis of hesitation—emotional expressions such as crying, laughing, fidgeting, raising of the eyebrow, frowning, etc. These may be much more important than verbal communications in revealing deeper, hidden emotional feelings which may be the cause of the somatic symptoms. The lack of knowledge of the cause thereby prevents a cure. We may then find ourselves with dozens of patients "circling" us and other physicians on a regular monthly basis. Hours of time are spent with patients on a superficial basis, never extracting the information essential to permanent resolution of the symptoms and signs of psychological and biological diseases!

Initial interviews of an hour or more may save time! It may even be therapeutic and eliminate the need for further pharmacological or professional support. This could save time for the physician and patient and reduce costs of health and disease care services.

The rearrangement of medical curriculum for premedical, undergraduate medical, graduate medical students is essential, if we are to produce future capable clinical physicians for our communities. Interview techniques should be taught before history-taking. Speech and communication courses for interpersonal understanding and persuasion should be taken in college before medical school. Comparative religion, philosophy, cultural anthropology, and sociology courses should be part of the premedical training. Graduate training should emphasize continuous comprehensive preventative medicine for ambulatory patients. We need to find the best way of doing this for our residents in training in family practice. Patients with rare and esoteric biologic diseases comprise the bulk of most medical school hospital populations. This is particularly true in state medical schools with rules and regulations allowing only admission of physician-referred patients to the university medical school hospitals.

Our Department of Family Practice and Community Health at the University of Minnesota Medical School, Minneapolis, Minnesota, is utilizing the expertise of a heterogeneous faculty. This includes family physicians, clinical psychologist and psychiatrists, a cultural sociologist-anthropologist, a biostatistician, an ordained minister/mar-

riage counselor, an educational psychologist, clinical pharmacist, and representatives of other major specialties in the medical school at a main university campus.

We are seriously looking at what it takes to extract valid information from people, families and communities. Quantitative analysis for clinical judgment and problem solving, chronobiology, interview techniques, tutorialships in introduction to clinical medicine, medical history taking, tutorialships for physical diagnosis, courses in Behavior of Man, Man in His Community, health hazard appraisal, genetic counseling, zoonosis, are a number of courses essential for the undergraduate students in medical school. They help him develop sensitivity and awareness as to how to go about extracting information for creative problem solving.

In our Model Family Practice Unit at the University of Minnesota Medical School, we have a part-time clinical pharmacist who works with our students. He supports the outpatient and inpatient services of the Department of Family Practice by identifying side effects and toxic effects of single and multiple drug ingestions of patients. We believe this close relationship with the pharmacist will upgrade care to the patient; the same could be true with the dentist, oral dental surgeon and others.

The following are some of the past research efforts of the Department of Family Practice and Community Health, University of Minnesota Medical School that could be utilized by other academic departments of family practice in other universities around the world:

1. To define the body of knowledge encompassed by family practice by a study of current general practice and by an ongoing analysis of the Department Model Family Practice Unit at the University and in other settings.
2. To develop an ongoing program for the education of health workers and patients designed to broaden the base of responsibility and obligations for ongoing health care.
3. To develop a program for self-recording of data collaborating with experts in chronobiology. Patients have been enlisted in this program designed to provide new methods for disease prevention and early detection.
4. To utilize the technique of statistical decision analysis to help define the pathway of medical decision making, and to utilize this tool in the education of all health professionals.

To establish a broad data base through improved documentation and record-keeping in the Model Family Practice Unit for research studies in family practice.

To improve pharmacists', patients', and physicians' cooperation in health care delivery.

7. To help health care professionals improve their ability to listen and communicate with and understand their patients.

These are just a few of the many efforts being put forth by the family practice department at the University of Minnesota Medical School.

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Current Techniques in Radiation Therapy— External Beam: Part II

The University of Minnesota will offer its annual course on Radiation Therapy—Radiation Oncology on May 16-18, 1973. The course will be entitled "Current Techniques in Radiation Therapy—External Beam: Part II."

The course is designed primarily for general radiologists, therapeutic radiologists, and residents. It will present practical concepts in radiation treatment utilizing external beam to include techniques in cervix, vagina, endometrium, ovary, and other gynecologic cancers, bladder, prostate, testicle, colo-rectal cancers, non-Hodgkin's lymphomas, and bronchogenic cancer. Also included will be a clinically oriented analysis of the various external beam supervoltage units, their practical applications and relations to basic treatment patterns. There will also be demonstrations of Brachy therapy, applications and a discussion of the practical applications of the computer, and combined chemotherapy and radiation therapy in the treatment of solid tumors in adults.

Fee: \$120.00. Further information may be obtained from the Office of Postgraduate Medical Education, University of Minnesota, Room 205 Nolte Center for Continuing Education, Minneapolis, Minnesota 55455, or by calling (612) 373-8012.

HERE'S WHERE TO BE IN '73



**RADISSON
South**



**Minnesota
State
Medical Association
May 24-25, 1973
Minneapolis, Minnesota**

Minnesota State Medical Association

If You Take the Time—We Have the Place . . .

YOU, AS A DOCTOR, must often feel the need for more than your share of human time and energy, as priorities keep getting out of order, your attempt to meet all the demands made on you. For this, and other reasons, you owe it to yourself to get a piece of the action on May 23, 24, and 25 at the Radisson South, in Minneapolis, when the Minnesota State Medical Association puts it all together for you at the 1973 annual meeting.

RELAX MIND AND MUSCLE in the golf and tennis tournaments on Wednesday, May 23, or lose yourself in the swim, sun and sauna atmosphere of Radisson's Resort World. Dine leisurely in the carefree mood of three excellent restaurants. Then, renewed in mind and spirit, attend the open hearings of the reference committees in the afternoon and evening. This is your opportunity for input to the grass root functions of your professional organization—to have a part in resolutions that go to the House of Delegates for action and possible incorporation into Association policy.

ON MAY 24, YOU STEP into a world of scientific sessions—designed with you in mind—to enrich your knowledge and provide opportunity for questions, discussion, and exchange of opinions.

YOUR PROBLEMS AND YOUR INTERESTS form the nucleus of the planning for the scientific assembly—giving you information applicable to your patients and to your field of health care delivery. Specialties of the session leaders range from cardiovascular diseases and internal medicine to the behavioral sciences.

Your colleagues, planning the scientific program, are giving generously of their time and expertise. Their efforts deserve your support.

WATCH YOUR MAIL FOR YOUR COMPLETE PROGRAM. See what's in store for you. You'll attend presentations in comfortable settings followed by a chance to discuss informally, at lunch, your particular areas of interest with the various session participants. There'll be time for the "pause that refreshes"—to enjoy free Coke or Fresca as you see the exhibits—and "rap" with your colleagues.

ZEROING IN ON YOU AND YOUR NEEDS, "The Personal Life of the Physician" comes into focus as the subject of a session at 3:30 p.m. on Friday, May 25th.

ABORTION PROCEDURES IN THE first and second trimesters will be the topic of talks by Dr. Jane Hodgson of St. Paul and Dr. Robert Goodlin of Stanford University's School of Medicine during the closing sessions on Friday.

OF REAL INTEREST TO YOU are the scientific exhibits which graphically present advancements in techniques, procedures, treatment, and other related developments in medicine.

SHARE THE WEALTH of knowledge the meeting offers with the interns, medical students, nurses, dietitians and technicians you meet in your work-a-day world—encourage them to attend.

HOW CAN ONE MEETING OFFER SO MUCH? You'll find the answer in the Great Halls, East and Center, and the Great Hall Foyer where the "paying" guests present to you their technical exhibits. Their dollars provide financial pillars that help support the whole meeting structure. They underwrite a good share of the expense—and they offer some real help to you on problems ranging from money management to patient management. Your schedule will allow time to talk with the people who've paid to bring their products to you. It's all there in attractive displays, conveniently close to the action.

SOMETHING SPECIAL FROM THE SPECIALTIES is the "Symposium on Trauma" presented May 25th by the Minnesota Chapter of the American College of Surgeons. Plans include a full morning of meetings, discussion, and dialog on treatment of the injured (from initial assessment to the role of nursing care) and a noon business luncheon meeting which features a talk on cancer patients and hospitals by Andrew H. Mayer, M.D., a Fellow of the American College of Surgeons.

THE PHYSIATRIC SOCIETY'S day of recognition for Dr. Miland Knapp takes place on Saturday, May 26, from 8:30 a.m. to 4:30 p.m., with a pleasant break for an enjoyable noon luncheon, at which Dr. Knapp will speak.

ON WEDNESDAY, MAY 23, from 9 a.m. to noon,

ANNUAL MEETING

the faculty from the Department of Family Practice and Community Health at the University Medical School will conduct "An Educational Seminar and Information Exchange for Preceptors of Phase B, Phase D, and the Rural Physician Associate Program."

YOUR WIFE WILL RECEIVE A WARM WELCOME from the ladies of the Woman's Auxiliary. They invite her to join them at the functions of their general membership. If she's not a member, they'd especially like to greet her. The Auxiliary's other-than-business plans include a social hour, luncheon, tea and festive banquet on Thursday evening. Here, the ladies will join their husbands in honor-

ing those physicians who celebrate fifty years as licensed practitioners, the recipient of the Association's Distinguished Service Medal and the President's Plaque and Awards; and they'll welcome the incoming president. Dancing follows in the beautiful garden court.

YOU CAN CURE YOUR PRIORITY ILLS with one capsule of professional seminars; a brief holiday; and time for your wife and family. Write yourself a prescription. Take as directed at the Minnesota State Medical Association's Annual Meeting . . . Radisson South, Minneapolis, May 23, 24, and 25 . . . the place to be in '73.

1973 Schedule of Events

Wednesday, May 23

Credentials Committee, 12:15 p.m., Great Hall Foyer
House of Delegates, First Session, 1 p.m.—Great Hall West
Delegates/Councilors Buffet, 6 p.m.—Tiffany
Reference Committees—Open Hearings, 4 p.m.—Verandas 1, 2, 4, 6, 8
Reconvene 7:30 p.m., Verandas 1, 2, 4, 6, 8
Annual Golf Tournament—Minnesota Valley Country Club
Annual Tennis Tournament—Normandale Tennis and Swim Club
Specialty Group Meetings

Thursday, May 24

Breakfasts—Committee, 7:30
Exhibits Open, 8:30-5:00—Great Hall East, Center, Foyer
Scientific Sessions Begin at 9:00 a.m. and continue throughout day
MSMA Luncheon, 12:30 p.m.
President's Reception, 6 p.m.—Garden Court
Annual Banquet, 7 p.m.—Great Hall West, with dancing following at 9:30 in the Garden Court
Specialty Group Meetings

Friday, May 25

Breakfasts—Committee, 7:30
Exhibits Open, 8:30-5:00—Great Hall East, Center, Foyer
Scientific Sessions—Begin 9:00 a.m. and continue throughout day
House of Delegates, 2nd Session, 1:40 p.m.—Great Hall West
MSMA Luncheon, 12:30 p.m.
Specialty Group Meetings

Saturday, May 26

Specialty Group Meeting

ANNUAL MEETING

Scientific Program

1973 Minnesota State Medical Association Annual Meeting

Thursday, May 24

Physiology in Daily Practice

Basic scientists will join with clinical practitioners throughout the day to correlate cellular, organ, and system physiology with the problems met by the doctor in daily practice.

9:00-10:30—The Big Heart

Session Leader: Carlos E. Harrison, Jr., M.D. Arnold L. Brown, Jr., M.D.; George Cooper IV, M.D.; Dieter W. Sack, M.D.

Cardiac pathophysiology and basic mechanisms will be discussed in informal exchange in terms of clinical problems including atrial septal defect, valvular stenosis, and the chronic potassium depletion syndrome of congestive heart failure. Hypertrophy of the heart is a fundamental response to work overload. It may be secondary to excess flow as for example in septal defects or to obstructive valvular disease such as aortic and pulmonary valve stenosis. The external work performed by the heart muscle is one of the major determinants of myocardial oxygen consumption. Changes in ionic fluxes in the organelles of the cardiac cell occur in response to work overload in the heart and in heart failure. Cases exemplifying each of the clinical problems will be presented to illustrate recent advances in clinical non-invasive technics and the discussion will link current concepts of cardiac contraction, energetics, and hypertrophy to these clinical problems.

11:00-12:20—HYPERTENSION 1973: Basis for Rational Management Decisions

Session Leader: Cameron G. Strong, M.D. L. A. Brennan, Jr., M.D.; F. G. Knox, M.D., Ph.D.; R. M. Tucker, M.D.

A physiologist and three clinicians argue that understanding the physiology of hypertension can help the physician make management decisions for his hypertensive patients.

Illustrative case examples will be used to provoke discussion from panel members and audience alike as mechanisms operative in the hypertensive patient are explored. Particular attention will be paid to the best methods of obtaining and interpreting the numbers defining the operative mechanism and suggesting optimal management choices.

This discussion will necessarily involve sodium and potassium handling by the kidney, the renin-angiotensin-aldosterone system, the use of plasma renin activity in the diagnosis of the various subgroups of hypertensive patients, and the physiologic derangements produced by renal insufficiency.

The panel members will attempt to integrate this basic information in formulating management programs for patients with commonly encountered hypertensive problems.

1:40- 3:00—Psychopharmacology and Brain Function

Joint Session Leaders: Faruk S. Abuzzahab, Sr., M.D., Ph.D. and Jack Kelley, M.D.

Recent advances in the neurochemical transmission have helped us evolve a unified understanding of the mechanism of action of psychoactive medications as well as some of their behavioral side effects. The antidepressant, antiparkinson and hallucinogenic drugs are viewed as capable of increasing synaptic transmission, while the antipsychotic, antianxiety and hypnotic agents decrease synaptic transmission in a differential manner. The success of drug applications in the control of the major symptoms of schizophrenic and affective disorders have lent further proof to the theory that there may be a defective neurotransmission as the underlying etiologic factor in these disorders. Some antihypertensive medications (pargyline, methyl dopa, guanethidine) and anesthetics (droperidol, ketamine) also act on the synaptic transmission and might interact with psychoactive medications. The neurotransmitter theory is making inroads in elucidating the neurophysiologic basis of emesis, hostility, libido, memory, rapid eye movement (REM) or dream state and drug withdrawal symptoms. Eventually, this would assist us in developing drugs that could possibly alter these states.

ANNUAL MEETING

Thursday—Continued

3.30- 5:00—Immunology, Infection and Cancer: 1973

Joint Session Leaders: Charles F. McKhann, M.D.; Richard L. Simmons, M.D. and John H. Kersey.

The immune response now appears to have at least two components: cellular immunity and antibody production. Each of these undergoes its own separate route of development and has its own spectrum of specific activities. Often the two systems interact with each other so that the response that we see in the form of antibody production or graft rejection is the result of a combined effort. The immune or "killer" lymphocyte, which is responsible for the rejection of transplanted tissues, develops under the guidance of the thymus and is called a T-lymphocyte. Its counterpart, the B-lymphocyte, is derived from the bone marrow, and is eventually responsible for antibody production. Many antigens induce responses in both systems and some actually require the participation of both systems before an effective immune response is obtained.

There are two interesting interactions between infections and the immune response. The first of these is where the infection itself depresses the immune response and may actually pave the way for super infections that follow. The converse of this is where the immune response is defective, leaving the host vulnerable to a wide range of infections. In addition to the immunologic deficiency diseases, patients undergoing immunosuppression for transplantation or for a variety of other diseases are unusually prone to the development of infections. It is noteworthy that many of these serious infections result from over growth of common organism which the normal individual controls without difficulty.

Tumors also appear to have an intimate interaction with the immune system. Some tumors depress the immune response quite seriously, not only with respect to that specific tumor but in general. Conversely, a wide range of human tumors appear to be antigenic in their own right and capable of specifically stimulating immunity. The paradox is why these tumors grow so successfully in the face of host immunity. Several mechanisms by which the tumor may escape from immune control are not known. Knowledge of the immune interaction that takes place between the patient and his tumor has led to a variety of attempts to manipulate the immune response to increase its effectiveness as a defense mechanism.

Friday, May 25

Daily Practice in Society

Clinical practitioners and behavioral scientists will discuss the problems of practicing medicine in contemporary society.

9:00-12:00—Symposium on Trauma—John F. Perry, M.D.

All specialties, as well as general medicine, will find these topics of interest: (1) Initial Assessment of the Injured Patient—Ernest Ruiz, M.D. and Robert A. van Tyn, M.D. (2) Treatment of Shock in the Injured Patient—Richard C. Lillehei, M.D. and Ronald Dietzman, M.D. (3) Diagnosis of Visceral Injury Following Blunt Abdominal Trauma—Richard G. Strate, M.D. (4) A Protocol for Evaluation of Genito Urinary Injury—Alexander Cass, M.D. and Gerald Ireland, M.D. (5) Anesthesia in Severely Injured Patients—Claude Swayze, M.D. and G. Thomas Wier, M.D. (6) Management of Injuries in Childhood—Arnold Leonard, M.D. (7) Assessment and Early Management of Maxillofacial Injuries—Lawrence Boies, M.D. (8) Fracture Management in the Patient with Multiple Injuries—Thomas Comfort, M.D. (9) Problems in the Nursing Care of Patient with Multiple Injuries—Rita Laska, R.N.

9:00-12:00—Symposium on Trauma—John F. Perry, Jr. M.D.

Session Leader: Donnell D. Etzwiler, M.D.

Health care is undergoing immense changes. Health professionals and patients alike are concerned about the quantity, quality, and cost of such services. Health professionals are currently joining together in forming "teams" capable of providing more and better care at a lower cost. While this approach is an improvement, the most important member of the health care team is all too frequently forgotten—the patient himself.

Effective treatment of chronic diseases or the maintenance of good health can only be achieved with the cooperation of an informed and interested patient.

To prepare patients and members of their families to recognize their role and assume their rightful responsibilities, planned systems of patient education are necessary. The panel of health professionals and consumers will discuss the importance of patient education and involvement as a part of quality health care.

ANNUAL MEETING

Friday—Continued

11:00-12:00—Children in Trouble: The Early Years—Session Leader: Francis S. Wright, M.D.

Early identification and appropriate management could well be the key to problems of the young—many of which a physician may encounter in his own family life. Discussion will investigate developmental problems, behavior disorders, learning difficulty, and the family stress syndromes that come into play in the treatment of children.

1:40- 3:00—Problems of Aging—Session Leader: Floyd K. Garetz, M.D.

Perceptual and Psychological Changes in Aging, Peter R. Peth, M.D.; Inner Life of the Aged, John P. Brantner, M.D.; Gerontological Aspects of Aging, Stafford W. Gedge, M.D.; Common Psychiatric Problems of the Aged, Floyd K. Garetz, M.D. and Medical Management of an Aging Population, Jesse J. Barron, M.D.

Science has added years to human life and produced new problems in gerontology that demand solution and management. The physician needs to seek out ways to help an aging population handle the psychological changes and common psychiatric problems thrust upon it in today's youth-oriented society. As the years add up for his patients, he strives to understand their inner lives and what his medical role will be. This session hopes to stimulate thought and provide some answers to the problems of adding better living to longer lives through medical management.

3:30- 5:00—The Personal Life of the Physician

Joint Session Leaders: John W. LaBree, M.D. and Carl E. Christenson, M.D.

Problem Solving in Clinical Medicine—Laurence A. Savett, M.D.

The "problem oriented system" is a system for clinical problem solving, and a key part of this system is a structured medical record which contains *cumulative* data in an *accessible* format.

The essential part of the system is a problem list. If it is complete and comprehensive, the problem list accrues the following benefits to patient care: (1) provides a means for recalling data which may not be significant when first recorded but which may be significant later on, (2) flags signs and symptoms which demand workup or followup, (3) tends to crystalize clinical relationships which otherwise would not be apparent, and it enables the physician to construct a reasonable differential diagnosis for a new problem. It establishes the "clinical context," (4) guides therapy and (5) provides the framework for professional-to-professional communication. In particular, the nurse can participate to a greater extent in data collection, decision making, and patient teaching, once she is aware of the diagnostic and therapeutic problems.

Specific cases will be presented to illustrate these points.

The Doctor's Image of Himself—C. Dwight Townes, M.D.

Problems come to mind first. There are joys in the personal life of physicians: status; gratification of doing good for people; the depth of understanding for your own and your family's feelings which you can gain from studying and dealing with the feelings of patients; the excitement of dealing with life and death.

What does being a physician do to his or her personal life? It can make many things difficult, but it's not the situation the physician is in that determines this. It's what he does with it. It can drive him to drink, drugs, divorce, and death more than most occupations.

Why? Is it the stress of the job—or the vulnerability of the type of person who goes into medicine?

One great problem for the physician is the apparent requirement to be a god. Is this possible? He knows he has clay feet, but he wonders if he will be destroyed if he shows them. To whom can he go for help?

This session will attempt to grapple with these and other burning questions of the physician's personal life.

Management of a Doctor's Earnings—Gary D. McDowell

The presentation concerns itself with two interrelated topics of equal importance to the physician—management of current income and disposition of net worth.

The first involves the personal management of professional earnings. Primary stress is placed on the four phases of financial planning: audit, plan, implementation, and monitoring. Special emphasis will further be placed upon the avenues of investment available, their tax impact, and the risk reduction elements to be considered.

The second will deal with the family planning and tax considerations inherent in property devolution. Primary emphasis will be placed upon the use of trusts to minimize the impact of federal and state taxes and to provide utmost flexibility for the individual family situation.

ANNUAL MEETING

Friday—Continued

1:40- 2:20—The Medical, Psychological and Social Hazards of the Abortion

Session leader: Fred E. Mecklenburg, M.D.

Several sets of data from current U.S. and world literature on the immediate and long-range morbidity and mortality of induced abortion, including the so-called "latent morbidity" or effect on subsequent pregnancies will be presented.

Specific problems of accurate data collection and how this applies to currently available data from New York and other "liberal" abortion states will be discussed as will the problem of prematurity as an aftereffect of induced abortion with supporting data from Eastern Europe and Japan.

The specific hazards of intrauterine saline abortion causing coagulation defects and maternal hemorrhage and the hazards of interruption of the first pregnancy will be stressed, with supporting data.

Confusing psychiatric data will be reviewed.

2:20- 3:00—Preabortion and Postabortion Counseling

Session Leader: Fred A. Lyon, M.D.

Pre- and postabortion counseling is an integral part of the care a patient receives when considering terminating a pregnancy. The follow-up care is just as significant and important, since it is at this time that any further questions can be answered. It gives the physician the opportunity to reinforce the instructions given at the time the abortion was performed.

At the preabortion counseling session, the patient's fears about her pregnancy are discussed; the alternatives to terminating the pregnancy are elaborated; the techniques of performing the abortion are explained to allay fears and apprehension and the reasons why the patient became pregnant are reviewed, and constructive information and advice is offered. Plans for referral to social service agencies are investigated.

The patient is reassured that her physical health is not impaired. Support is given to allay any fears regarding her emotional health. The concept of pregnancy prevention is again mentioned, and the opportunity is taken to inquire whether birth control is actually being used. (A recent published study shows that 38% of women given contraceptives at the time of abortion are no longer using any protection 12 months later.)

Counseling should be made available to all patients seeking abortions. It should not be compulsory. To deny a patient an abortion because she rejects counseling would be foolhardy. Physicians should acquaint themselves with the current techniques of counseling.

3:30- 5:00—The Abortion Procedure

Joint Session Leaders: P. Theodore Watson, M.D. and Erick Y. Hakanson, M.D.

The First Trimester Abortion—Jane E. Hodgson, M.D.

The conservatively aloof attitudes of the medical profession toward providing abortion and contraceptive services as a part of routine health care have long been apparent. The recent legalization of pregnancy termination by the Supreme Court should greatly help in making these services available to all women. The New York State experience of the past two years has documented the safety of performing first trimester abortions with vacuum aspiration in a non-hospital setting.

The advantages of the free-standing clinic over hospital abortion services are several, with emphasis on accessibility, lowered complication rates, reduced costs, and less patient dehumanization. The experiences of a Washington, D.C. non-profit, tax-exempt, free-standing abortion clinic and the technique and complications of the first trimester abortion with vacuum aspiration are described.

ANNUAL MEETING

Friday—Continued

Mid-Trimester Therapeutic Abortion—Robert C. Goodlin, M.D.

On our service, mid-trimester therapeutic abortions are accomplished with either hysterectomy, hysterotomy or hypertonic saline amnioinfusion. The saline technique is associated with the shortest hospital stay but with the most late complications, while the opposite is true of the hysterectomy technique. Several other mid-trimester abortions techniques have been used (in small numbers of patients) but with less satisfactory results.

The present saline amnioinfusion technique includes: (1) withdrawal of 50 to 200 ml of amniotic fluid, (2) gravity infusion or injection of 200 to 250 ml of 20% saline plus antibiotic, (3) intravenous oxytocin infusion at rates of 50 to 300 mu/min, (4) cervical insertion of laminaria tents or a Foley catheter. Past serious complications include: (1) water intoxication, (2) septicemia, (3) hypofibrinogenia with renal failure, (4) lower segment lacerations with retroperitoneal hematoma and (5) cervical fistuli; but no maternal deaths have occurred.

A problem common to all mid-trimester abortion techniques is associated emotional stress of both hospital staff and patients. Since we are unable by physical examination to estimate gestational length closer than \pm three weeks, an occasional viable size fetus is unintentionally destroyed. Likewise, unlike the patient requesting first trimester abortion, those asking for mid-trimester abortions often are ambivalent over terminating the pregnancy and in my experience, frequently express feelings of guilt or hostility after the procedure.

ATTEND YOUR ANNUAL MEETING!!!

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1. Latiolais, C. J., and Berry, C. C.: Misuse of Prescription Medications by Outpatients, *Drug Intelligence & Clin. Pharm.* 3:270-7, 1969.
2. Braverman, L. E., Ingbar, S. H., and Sterling, K.: Conversion of Thyroxine (T_4) to Triiodothyronine (T_3) in Athyrotic Human Subjects, *J. Clin. Invest.* 49:855-64, 1970.
3. American Druggist BLUEBOOK, March, 1971.

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Precautions: As with other thyroid preparations, an overdosage may cause diarrhea or cramps, nervousness, tremors, tachycardia, vomiting and continued weight loss. These effects may begin after four or five days or may not become apparent for one to three weeks. Patients receiving the drug should be observed closely for signs of thyrotoxicosis. If indications of overdosage appear, discontinue medication for 2-6 days, then resume at a lower dosage level. In patients with diabetes mellitus, careful observations should be made for changes in insulin or other antidiabetic drug dosage requirements. If hypothyroidism is accompanied by adrenal insufficiency, as Addison's Disease (chronic subcortical insufficiency), Simmonds's Disease (panhypopituitarism) or Cushing's syndrome (hyperadrenalism), these dysfunctions must be corrected prior to and during SYNTHROID (sodium levothyroxine) administration. The drug should be administered with caution to patients with cardiovascular disease; development of chest pains or other aggravations of cardiovascular disease requires a reduction in dosage.

Contraindications: Thyrotoxicosis, acute myocardial infarction. **Side effects:** The effects of SYNTHROID (sodium levothyroxine) therapy are slow in being manifested. Side effects, when they do occur, are secondary to increased rates of body metabolism; sweating, heart palpitations with or without pain, leg cramps, and weight loss. Diarrhea, vomiting, and nervousness have also been observed. Myxedematous patients with heart disease have died from abrupt increases in dosage of thyroid drugs. Careful observation of the patient during the beginning of any thyroid therapy will alert the physician to any untoward effects.

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Health Care Delivery

RICHARD E. YA DEAU, M.D.*

OUR MEDICAL COMMUNITY has been responsive to demands placed upon it to insure adequate training of physicians through appropriate licensure laws. More recently new pressures arose as a series of legal decisions extended the concept of accountability beyond the patient-doctor relationship: institutions have been held responsible for the quality of medical care delivered within their doors. The former concept of quality control depended upon input measures to assure that patient care was appropriate; the latter, upon malpractice to punish when care was inadequate.

Public law 92-603 has turned away from each of these avenues. It undertakes to create an ongoing program of quality assurance. It contains elements of quality assessment and quality control. It directs itself to the necessity of medical care delivered, its quality, and the facility in which it is rendered.

This paper represents the highlights of the Foundation For Health Care Evaluation's presentation to the physicians of the Metropolitan area last March.

Analysis of the Law

PSRO means Professional Standards Review Organization. Public law 92-603 requires that there be created a National Professional Standards Review Council. In each state where three or more PSRO's exist, there shall be a State Professional Standards Review Council. Furthermore, establishment of a Professional Standards Review Organization by the physician community must occur before 1976, or, should they decline to do so, other knowledgeable people may be so appointed.

Broad Concepts

There are basically three constructs available to physicians today which will enable them to live under public law 92-603. The first comes from New Mexico where the concept of a PSRO as a central authority has been established. That central authority projects itself into every member institution and does for those institutions those

things which we traditionally hold as being the privilege of the institution. In essence this will construct a central authority from which goes out all power and under which each institution must live.

The second concept is a smaller central authority: smaller because it sends its designee to function within each institution. This central authority selects and trains people who will function within an institution, available for consultation and dialogue, but basically retaining the right, the power and the authority to run pre-admission screening, utilization review and quality assurance (quality assessment and quality control) in the institution. This is very similar to the HASP program in Illinois where there is a designee in each institution for utilization review.

The third concept available to the medical community today does not have a major central authority performing all activities and does not have a smaller central authority with designees in every institution. It is the concept embodied in the programs of Minnesota's Foundation For Health Care Evaluation. This concept is one where the PSRO acts as a guarantor that appropriate activities which fulfill federal law 92-603 occur within each institution. The hospital medical staff of each institution would be organized to relate with the PSRO as it accomplishes the utilization and quality assurance programs. By reducing in each institution the physician committee commitment to a single set of functions fulfilling both the public law and those functions related directly to their own hospital board, a continued reduction in required physician time is anticipated. The PSRO then stands not as a central authority, but as a guarantor on behalf of the medical community, physicians, administrators, patients and governing boards.

These are the three options that we have available to us today. There is no way to predict what the physician response will be, but it is hoped that by looking at the measured steps with which this law was constructed, all will agree that the option of enabling every institution to do these

*President of the Foundation for Health Care Evaluation and Chief of Staff of Bethesda Hospital, St. Paul.

activities themselves is a superior route to allowing a central authority to make these decisions in another's behalf.

The basic tenet running through the Foundation proposal is the belief that the hospital medical staff committees can function to fulfill the requirements of public law 92-603. Within the state of Minnesota there have been many hospitals able to look at quality assessment and to perform a benchmark job.^{1,2} The tools to accomplish these functions are available today.

A corollary to the Foundation's faith in the hospital medical staff committees is the belief that there are established organized relationships in each hospital which can be structured to compile a reporting document usable by both the individual institution and the Foundation For Health Care Evaluation to fulfill the requirements of this law.

The Foundation proposal is a different format.

It acts as a guarantor, being a recipient of documents, not the purveyor of these types of activities. Hence this PSRO design would be able to cover a larger area and to provide less disturbance and dislocation of practice patterns within the individual institution. These concepts will be valuable regardless of the PSRO designation because there is a right within the law for an institution to escape PSRO authority if it can develop appropriate self-controls. In designing this program there is the assumption that every one of the hospitals represented, every one of the physicians within the community would prefer not to function under a central authority, but would prefer to function in a responsible manner within the framework of their governing board. With that assumption, taking these programs, it is reasonable to expect an institution would be able to rise out of whatever restraints might be designed by any subsequently constructed PSRO.

A Study of Public Law 92-603

The Law

Sec. 1152 (b) (1) (A):

"An Organization

"(ii) which is composed of licensed doctors of medicine or osteopathy engaged in the practice of medicine or surgery in such area."

"(iii) The membership of which includes a substantial proportion of all such physicians in such area."

Sec. 1155 (d):

"... Each PSRO ... shall ...

"(1) Encourage all physicians practicing ... in the area ... to participate as reviewers in the review activities ..."

"(2) Provide rotating physician membership of review committees ..."

"(3) Assure that membership on review committees have the broadest representation feasible ..."

The Interpretation

Organizational Requirements:

As the law is constructed, it initially requires that the PSRO be a physician organization, the word "physician" including all medical doctors and doctors of osteopathy.

The physicians who make up the PSRO must be representative of the area. This means that there is no way that a group at the Foundation For Health Care Evaluation or any other group can be appointed without physician advice and consent. Ten percent of the physician community can require an open election. In an open election 51 percent of those people voting (not of the total electorate) are necessary to bring a PSRO designation.

Not only must physicians agree to be served by the PSRO; they must agree to serve for the PSRO.

Rotating participation on the reviewing panels and committees insures that all physicians ultimately have an opportunity to affect the elements ultimately designated as good medical practice.

HEALTH CARE DELIVERY

The Law

Sec. 1155 (a) (5):

"Physicians . . . may be only those having active hospital staff privileges in at least one of the participating hospitals in the area."

The Interpretation

Reviewer Qualifications:

A specified reviewer qualification is the requirement that every physician so designated have active membership on a hospital medical staff within the area. Additionally we find that the Joint Commission on Accreditation of Hospitals is working very strongly to insure that physicians are not denied active hospital medical staff membership in lieu of a more specific deliniation of their privileges.

Review of Professional Activities

Sec. 1155 (a) (1):

" . . . It shall be the duty . . . of each PSRO to . . . determine whether—

"(A) Such services and items are or were medically necessary"

"(B) The quality of such services meets professionally recognized standards"

"(C) . . . Such services and items could . . . be effectively provided on an outpatient basis or more economically in an inpatient health care facility of a different type"

with respect to "the professional activities of—

"physicians

"other health care practitioners

*"institutional and noninstitutional
providers of health care services"*

Suffice it to say that these activities as to necessity, quality and point of service (i.e. facility) must be done for all physicians in the area and for the institutions, namely hospitals. In essence, the necessity, quality and location of health care delivery will be spelled out under the requirements of federal law in a physician specific and institution specific manner.

Sec. 1155 (e) (1):

"Each PSRO shall utilize the services of and accept the findings of a hospital or other operating health care facility or organization . . ."

Hospital review committees have an option to affect these activities. What a PSRO may do is request of the audit committees in the hospitals that they accomplish these activities with respect to the quality of surgery or medicine delivered and subsequently take the findings as a basis for their determinations. This is extremely critical as the Foundation is assuming that every hospital staff committee can function at an appropriate level so as to provide a PSRO with these findings and insure that the central authority will not have to intercede.

" . . . But only when and only to the extent and only for such time that such committees in such hospital or other operating health care facility or organization have demonstrated to the satisfaction of . . . (the PSRO) . . . their capacity effectively and in timely fashion to review activities . . ."

However, the hospital staff committees must provide programs which are equal to or better than the programs that would be mounted by the central authority. Every hospital can make its committees function in a manner allowing escape from an outside, nonresponsive controlling organization, but they cannot escape from documentation and reporting.

The Law

Sec 1156 (a):

"Each PSRO shall apply professionally developed norms of care, diagnosis, and treatment based upon typical patterns of practice in its regions . . . as principal points of evaluation and review."

Sec. 1156 (a):

"Where the actual norms of care, diagnosis, and treatment in a PSRO area are significantly different from professionally developed regional norms of care . . . the PSRO shall be so informed."

"And in the event that appropriate consultation and discussion indicate reasonable basis for usage of other norms in the areas concerned, the PSRO may apply such norms."

The Interpretation

All of this activity deals with "health care norms," or standards. By law the medical community must be responsive to developing the standards against which practice will be measured. If the local health care community cannot develop the standards itself, then the National Professional Standards Review Council is prepared to afford the region those standards under which it must live.

Thus, there is an option to create local standards against which local care will be measured and judged, providing they are open, displayed and available for people to understand. If that opportunity is declined, there exists legal responsibility to live up to the standards that will be promulgated from Washington—promulgated without interchange and consultation of local physicians.

These local health care norms must deal with the common diseases that are every day occurrences; they must be disease specific and specific for the facility in which care is delivered.

There is a clause within the law concerning local health care norms: If the physicians, those who are providing medical care, can define on a local basis good medical practice and support this definition with adequate evidence, local norms can override the national and can be applied to local practice in lieu of national norms.

Each local region thus must spell those norms out and present them to the federal authority. There is, however, no reason to expect that the federal authority will be other than responsive to these norms as they are required by law to accept local variations where adequately documented justification exists.

Locally derived health care norms would, by the concept here-in conceived, be documented and reported by the institutions. Such norms must cover preadmission screening, utilization review, and quality assessment. In a local area, if this concept is endorsed, this means physicians are prepared to develop their own standards, define local good medical practice and do their own adjudication, using the member institutions.

HEALTH CARE DELIVERY

The Law

Sec. 1155 (a) (2)

"Each PSRO shall have the authority to determine, in advance . . . whether such service . . . would meet the criteria specified in clauses (A) and (C) (i.e. medical necessity and appropriateness of facility) in the case of

"(A) any elective admission to a hospital, or other health care facility

"(B) any other health care service which will consist of extended or costly courses of treatment."

Sec. 1156 (d) (1):

"Each PSRO shall . . .

"(A) specify the appropriate points in time after admission . . . at which the physician attending the patient shall execute a certification stating that further inpatient care will be medically necessary,"

(B) including "such information as may be necessary to enable such organization properly to evaluate the medical necessity of the further institutional health care"

The Interpretation

If the physicians are willing to perform these determinations, then by Public Law 92-603 these physician determinations must be accepted. That is, the local hospital organizations, the local hospital medical staffs can be responsible to this law, can make their decisions mandatory and binding and can affect 40% of the health care dollars flowing into area institutions.

Preadmission Screening

Preadmission screening essentially says that on every elective admission the necessity, quality and facility must be determined in advance, based on a dollar specific approach. Preadmission screening, if inappropriately designed could be so strident as to say "Doctor, you're admitting somebody with abdominal pain. Since this isn't an emergency, I'd like to see the documentation of all your workup for abdominal pain *before* you bring this patient into this institution."

This approach is comparable to the CHAP program design. If the medical community does not have a better answer, physicians will find the practice of medicine under preadmission screening fairly onerous as this concept would require the physician to provide full documentation from his office before any Social Security patient could be admitted to a hospital. Further, this concept would go so far as to require that this documentation be provided to a screener in the hospital who would then construct the initial day allowance, or the initial number of days that a patient could stay.

Utilization Review

Public law 92-603 also requires utilization review. It says specifically that the review requires the attending physician to create a certificate in which he documents the specific reasons he deems further hospitalization necessary. Thus, there must be some type of an update note that will fulfill this law, based on the record that is being constructed within the hospital.

The Law

"... not later than the 50th percentile of lengths of stay for patients in similar age groups, with similar diagnoses requiring various types of health care services or procedures."

Sec. 1161:

"Whenever any . . . determination—

"(a) denies any request . . . for approval of a health care service . . ."

(b) concludes . . . "that any such practitioner or provider has violated any obligation imposed . . ."

then . . . "immediately after taking such action or making such determination, give notice to such practitioner or provider of such determination and the basis therefore, and shall provide him with appropriate opportunity for discussion and review . . ."

Sec. 1158 (a) (2) & (b):

When . . . "such organization or other agency has . . . disapproved of the services or items . . . such organization shall" notify—

"... the practitioner or provider who provided or proposed to provide such services or items

"... the individual who would receive or was proposed to receive such services or items

"... The agency or organization having responsibility for acting upon claims for payment."

The Interpretation

While the Foundation would have preferred Congress to accept the 75th percentile review, they declined to do so and constructed their review at the 50 percentile. "Percentile" means the percentile of expected stay with like patients. For example, a patient has his gallbladder removed at hospital X. On day ten, 50% of those people would have gone home, thus on day ten the utilization review committee in hospital X looks at the medical record of this patient, searching for documentation that he could not have been served more rapidly and, indeed, that he continues to require institutional service.

This type of utilization review is not meant to escape the usual legal constraints and has included the right to notice, hearing and appeal. Whenever a request for a continued stay is denied, the doctor must be notified and given an opportunity to interface with the utilization review committee and explain why this patient still requires hospitalization.

Notification of disapproval is quickly provided under the law, not only to the hospital and the physician, but is also provided to the patient and to the fiscal intermediary, thus not allowing for the delaying tactics of interminable discussion.

*The Law**Sec. 1155 (a) (4):*

"Each PSRO shall . . . (maintain and regularly review) . . . profiles of care and services received and provided—

" . . . with respect to patients

" . . . with respect to each health care practitioner

" . . . with respect to each care provider

" . . . to determine whether the care and services ordered or rendered are consistent with the criteria specified."

Sec. 1160 (a) (1):

"It shall be the obligation of any health care practitioner and . . . any hospital or other health care facility . . .

"To assure that services or items ordered or provided . . . to beneficiaries . . . under this act—

"(A) will be provided only when, and to the extent, medically necessary

"(B) will be of a quality which meets professionally recognized standards of health care

"(C) will be supported by evi-

**The Interpretation
Quality Assessment**

These elements of the law were already strident enough. Section 1155 moves into a very interesting area, legislating the maintenance and review of profiles with respect to patients served, with respect to the physician performing the service and with respect to the hospital.

Further, these profiles must be brought together into a cluster so that it is apparent if any of the physicians, hospitals, or patients are providing or being provided inappropriate care.

Are these profiles not much better at home within the individual hospital medical staffs than they are in the hands of a central authority?

The Joint Commission on Accreditation of Hospitals has already decided that in the very near future each institution will have such profiles for the credentialing and recredentialing processes. At the accreditation survey an institution might say, "This physician has the right to handle a diabetic in ketone-acidosis." The response of the JCAH will be: "All right, Mr. Hospital Medical Staff, on what grounds do you have to provide that physician with the privilege of treating diabetics in ketone-acidosis? Let us see his performance pattern. Let us see documentation that shows that he has had training. Or, if you can't show us that he has training, at least show us that he has been adjudged competent by your hospital medical staff and, in addition, show us his experience."

This is coming from the Joint Commission as an accreditation requirement.

Practitioner and Provider Obligations

Many who read this law feel that the law deals with PSRO's alone. It also deals with physicians. Everything to this point deals with the requirements necessary to monitor the necessity of medical care, quality of medical care and the facility in which it's delivered. But, there is a whole other segment—section 1160 which defines the responsibilities placed upon the health care practitioners regardless of PSRO activities.

This is the first time that these physician obligations have ever been spelled out in writing. Specifically, physicians will be held responsible for the services delivered: for the necessity, for the quality and for the evidence thereof.

*The Law
dence of such medical neces-
sity and quality."*

The Interpretation

Section C of the law requires every physician to create a document which will support necessity and quality. In a very specific fashion, the law is saying that a physician who does not create an adequate medical record documenting his care, by definition is not providing quality medical care.

The law spells out the physician requirement to create documentary evidence which supports his patient care programs. If the care is not so supported in the medical record, then by definition, it was not provided and care will not be remunerated . . . the dollars will not be given.

* * * *

Proposals of the Foundation for Health Care Evaluation

Preadmission Screening

Of all the programs, preadmission screening will be the most difficult for the medical community to live with. It could function in any one of three ways: through a central authority, through a hospital-based designee of a central authority, and through an institutional program such as the one the Foundation proposes.

The first method has a central authority telephone exchange and document reception point. The physician wishing to electively hospitalize a patient will call that telephone authority where non-physician personnel will reference a book of protocols specifying the tests required prior to hospitalization. For example, looking up abdominal pain, the protocol might read, "The patient should have had testing such as IVP, colon, upper GI, gall bladder and procto prior to hospitalization." The physician must supply the central authority with the documentation of these tests before he can receive an initial day allowance for hospitalization.

In the second approach, every institution has within its structure a representative of the central authority who performs these tasks. This method is a little better in that the designee has the opportunity to interface with the hospital, physicians and administration. However, that administration still has no authority over that designee. That designee is bought, owned and loyal to the PSRO.

The Foundation is proposing that preadmission start through an effort of our member institutions

working through the Foundation to develop standards. Remembering that standards are *required*, these proposals emphasize local development rather than federal, implementing them in the hospitals where health care is actually delivered with the Foundation acting as a monitor.

The Foundation will guarantee that the activities in each institution are appropriate and will guarantee that the hospital committees are not constructing a whitewash to favor a few admitting physicians. On the other hand, the Foundation believes that the institutional physician committees should be responsive to the needs of the patients and their physicians. Thus, the institutional evaluation of the elements of good medical practice will indeed reflect the health care rendered in the institution.

These standards must include at least two sets. First, the standards will include a list of those diagnoses and therapies ordinarily handled outside the hospital. Given such a list of conditions when a physician admits a patient included on the listing he can be asked to document those unique characteristics which necessitate admission of the patient.

The second set to which the standards must address themselves are those diagnoses and therapies which are usually found within the institution. These standards should delineate the normal profile of activities, tests, etc., to be accomplished prior to hospitalization plus reasonable examples.

Once constructed by the area hospital staff committees and the Foundation for Health Care Evaluation the preadmission screening profiles will be

published as required by law. An admitting physician will then have two options. In the first option he simply admits the patient and states in the medical record that he is in compliance with the standards. In the second option the physician is allowed to override the constructed preadmission profile standards. However, he must state in the admitting note that he is overriding the preadmission profile and also specify his reasons for doing so.

Note that as yet neither a central authority nor a committee has been placed between the physician and his freedom to admit a patient to the hospital when he deems it necessary. The Foundation proposes that a committee review only those physicians who have more than 10% over-ride or more than 10% statements that they complied to the standards when their records do not substantiate this claim. At this point, the committee would review the physician's reasons for overriding, deciding either of two things: (1) that it represents good medical practice or (2) that it presents a deficiency.

In the first case, the committee agrees that the physician was working in the best interest of his patient and that the variation from the standards was in keeping with that patient's total needs. In the second case where the committee decides that a deficiency exists, that physician and that physician alone would be required to complete a preadmission document (certificate), and then only for a limited period of time. In other words, if a physician fails to comply with the preadmission standards and also fails to document the rationale for that override, his own committee then decides that there is a deficiency and requires him to create those numerous preadmission certification documents.

Utilization Review

The utilization review program has been designed to be patient specific, taking into account at the 50th percentile the patient's age, primary diagnosis, any operations that are performed; any complications that occur while the patient is in the institution and any other concurrent disease conditions.

This program requires the attending physician to complete a *short* update note, specifying the diagnosis, indicating the length of time he intends to keep the patient hospitalized and the reasons for this additional hospital time is necessary, and specifying his dismissal plans.

A representative of the hospital committee then

reviews the documents, verifying the medical necessity as documented in the record. Thus, if an inappropriate record has been created, the case will be disallowed not on the basis of the care provided, not on the basis of how sick the patient is, but on the basis of inadequate documentation. It should be pointed out that this is already the reason many patients have found themselves disallowed by Medicare, not because the care was not needed, but because the physician failed to successfully document that need.

The disallowal procedure takes into account very specifically the concepts of notice, hearing and appeal. Namely, as soon as the utilization review physician recognizes a patient who, by virtue of the record, should not be hospitalized, he contacts the attending physician. The attending physician then has the opportunity to change his record to reflect the patient's actual need or, if the record does reflect the patient's actual need, to initiate discharge procedures.

If the utilization review physician contends that the patient should not be hospitalized and the attending contends that he should, a designee of the chief of service or utilization review committee chairman will review the case. This guarantees that a patient is not sent home, is not disallowed medical services that he should be afforded.

All parties are to be put on notice and given a hearing *prior to* the dissolution of the fiscal obligation, rather than simultaneous to or subsequent to such dissolution. Appeal should be an appeal in fact, rather than an appeal in theory.

Quality Assessment

The final program deals with quality assessment. The bases for quality assessment are quality standards, or health care norms, against which all practice is compared. Quality standards can be defined as the appropriate elements of care, or "study criteria," plus all the exceptions to those study criteria which also reflect good medical practice. For example, if the study criteria deal with the appropriateness of Cesarean sections being done by the classical route versus the low cervical route, those exceptions in which the classical Cesarean is synonymous with good medical practice should be delineated.

Having institutionally determined study criteria against which medical care can be measured, the institutions would then be asked to create data displays. These displays would compare actual practice against the study criteria, thus allowing

the institutions to determine whether their practice is equal to or is dissimilar from the standards. These data displays can be created by a medical data analyst, a non-physician who does not make judgments as to what is good medical practice but merely compares side-by-side what physicians said they could deliver against what they actually are delivering.

Physicians then review any variations, deciding when a variation represents good medical practice and when it represents a deficient practice pattern.

Deficient practices then should be submitted to a deficiency analysis to determine the deficient agent (the whole hospital? a service? a cluster of physicians? one physician? a system?) and to determine whether one is dealing with a problem of knowledge or of performance.

The answer to these questions determine the corrective action to be mounted . . . whether a system is changed, an education program is conducted, a physician is counseled, new equipment is purchased, etc. . . .

The Foundation recognizes that there will have to be study criteria and that these will ultimately become standards. Exceptions must be spelled out and data displays constructed by the hospital medical record room. Each institution must handle in its committees all variations from normal, deciding what is good medical practice. Each must

be prepared to discover what is a deficiency and whether it's one of knowledge or performance. Each must ask the big question, "Who is the one who is deficient?" and from this design appropriate corrective action.

THE GOAL IS GOOD MEDICAL CARE!!

Conclusion

The Joint Commission on Accreditation of Hospitals has reviewed these programs and found them to completely fulfill their accreditation requirements. They are prepared to require this type of mature committee activity in every member institution that is accredited. To quote Charles Jacobson, J.D., Associate Director of the JCAH from his comments at the March 15 Foundation Staff meeting:

"The Joint Commission's new standards really predate anything you have heard concerning PSRO's. While essentially the Joint Commission's standards say nearly the same thing, we are interested in all patients and would say that all of those quality assurance mechanisms should be applied to every patient treated at the institution."

The real decision now is whether these types of activities are going to occur in a central authority where there is no recourse or whether it will be done at home in the hospital structure. As each of you make this decision, consider these words from the writings of Plato:

THE PUNISHMENT OF WISE MEN WHO REFUSE TO TAKE PART IN THE AFFAIRS OF GOVERNMENT IS TO LIVE UNDER THE GOVERNMENT OF UNWISE MEN.

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Contraindications: Children 14 years or less; senile patients; history or symptoms of G.I. inflammation or ulceration including severe, recurrent or persistent dyspepsia; history or presence of drug allergy; blood dyscrasias; renal, hepatic or cardiac dysfunction; hypertension; thyroid disease; systemic edema; stomatitis and salivary gland enlargement due to the drug; polymyalgia rheumatica and temporal arteritis; patients receiving other potent chemotherapeutic agents, or long-term anticoagulant therapy.

Warnings: Age, weight, dosage, duration of therapy, existence of concomitant diseases, and concurrent potent chemotherapy affect incidence of toxic reactions. Carefully instruct and observe the individual patient, especially the aging (forty years and over) who have increased susceptibility to the toxicity of the drug. Use lowest effective dosage. Weigh initially unpredictable benefits against po-

tential risk of severe, even fatal, reactions. The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias, including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonylurea, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

Precautions: The following should be accomplished at regular intervals: Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activity requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

Adverse Reactions: This is a potent drug; its misuse can lead to serious results. Review detailed information before beginning therapy. Ulcerative esophagitis, acute and reactivated gastric and duodenal ulcer with perforation and hemorrhage, ulceration and perforation of large bowel, occult G.I. bleeding with anemia,

gastritis, epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, aplastic anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fatal and nonfatal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomata, aggravation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with overdosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement.

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Opinion & Dialogue

"Prescription drugs – who should determine the maker?"

Dispenser of Medicine

Clifton J. Latiolais
President
American
Pharmaceutical
Association



Maker of Medicine

C. Joseph Stetler
President
Pharmaceutical
Manufacturers
Association



"Too many doctors are dependent on the economic consequences of their decisions." So stated an issue of *Medical News Report* (December 4, 1972), an independent weekly newsletter published by AMA Chief Executive F. J. Long, M.D.

Doctor, are you indifferent...

In discussing an anticipated increase in Blue Shield rates, *Blue Shield's* newsletter had this to say:

"In general, it can be said that doctors have given the impression that they are not particularly concerned with the increase in cost of health care to patients..."

"True, an MD's training is primarily scientific, but in the real world of practice, all of his scientific decisions have a price tag, or an economic impact. The economics of health care beckon the practitioner's attention. Concern for economics of medicine is a natural part of the physician's role."

When the pharmacist recommends that a drug product other than the one ordered be dispensed, the prescriber invariably permits the change when he feels the best interests of the patient will be served.

Shortcomings of Pro-Substitution Argument

The fact remains that it is necessary for the prescriber to know the change is being contemplated and to be in a position to comment or demur. Without that opportunity, a unilateral decision of the pharmacist made in the absence of clinical knowledge of the patient, could expose the patient to needless risks, and in addition, jeopardize the relationship between the professions of Pharmacy and Medicine. In my view, there is no offset in the pro-substitution argument that offsets these risks.

The Issue of Drug Knowledge

Substitution advocates claim that the primary justification for changing the rules is the desire to better utilize pharmacists' knowledge about drugs. Yet the pharmacist's task to keep current on the ever-changing field of drug therapy, to some extent, puts him at a disadvantage. Most often, a practicing physician will rely on expert knowledge of no more than

an obligation of medical
ce.
Medical societies ought to con-
tinuing campaigns to point
substantial savings that could
alized thru deductible insurance
protection for catastrophic ill-
At the very least, they should, in
patients' interest, question the
many insurance organization
is health care costs by forc-
holders to buy insurance
not need or want and prob-
ever use.

Many doctors are indiffer-
the economic consequences of
isions. Too many, for ex-
bitually hospitalize patients
venience of the MD. It's
ng to deny such habits exist...
Doctors, thru their medical so-
ave unhesitatingly appealed
patients for support in the
gust government interference
private practice of medicine.
e public in the past has re-
It's time the American Med-
association and state and local
societies paid off the debt by
vection to hold down the cost
al care."

of drugs

Insurance rates and hospital
are only two factors in health

care costs. The cost of drugs—both
prescription and nonprescription—is
another.

And when it comes to drug
costs, the nation's pharmacists are
concerned. Through their national
professional society, the American
Pharmaceutical Association, pharma-
cists are advising the public to use
nonprescription medication cau-
tiously and conservatively, and to seek
the advice of their pharmacist before
selecting or purchasing such drugs.

Outdated Laws

The pharmacist also is aware
that when it comes to prescription
drugs, often he has an even greater
opportunity to reduce the cost to the
patient—with no sacrifice in the qual-
ity of the medication dispensed. But
in many states, outdated and anti-
quated laws prevent the pharmacist
from engaging in drug product selec-
tion. "Drug product selection" simply
means that the pharmacist functions
in the patient's interest by con-
sciously choosing, from the multiple
brands available, a low-cost quality
brand of the specific drug to be dis-
pensed in response to the physician's
prescription order.

Much *misinformation* has been
purposely spread by those who stand
to gain financially by maintaining

high drug costs to the public. An end-
less stream of propaganda has ema-
nated from the drug industry in an
effort to persuade the medical profes-
sion that these so-called anti-substitu-
tion laws should be retained. And as
long as these laws are retained, the
drug industry will continue its current
marketing practices which contribute
unnecessarily to high drug costs to
patients. These practices also are in-
viting government agencies to expand
their restrictive controls on physi-
cians and pharmacists.

APhA Efforts

As pharmacists, we are con-
cerned about health care costs. We
hope that every physician shares our
concern on this vital issue, and will
give his personal support to the con-
structive efforts APhA has undertaken
in the interest of all patients.

*(For a complete discussion of
drug product selection, you are invited
to request a free copy of the "White
Paper on the Pharmacist's Role in
Product Selection" from: American
Pharmaceutical Association,
2215 Constitution Avenue, N.W.,
Washington, D.C. 20037.)*

gs that he selects to treat the
of conditions encountered in
ice. Moreover, the physi-
choice of a specific brand is
his knowledge of the pa-
medical history and current
tin, and his experiences with
icular manufacturer's

ne substitution proponents
ued that the dispensing of a
ion is a simple two-party
on between the pharmacist
patient, and that a substitut-
macinist may avoid even a
breach of contract by simply
the patient that he is making
stitution. I would judge that
ts would be sympathetic
c pharmacist who substituted
physician approval and who
ok a legal defense that seeks
the patient responsible for
macinist's actions.

Prescription Prices?

stitution advocates are
ng to the consumer, and par-
the consumer activist, that
prescription prices could
galization of substitution.
seen absolutely no evidence
this claim. To the contrary,
ice in Alberta, Canada, where
tion is authorized, suggests

the opposite.

Many pharmacists understand-
ably are concerned about the cost of
maintaining multiple stocks of similar
products. While there is no doubt that
inventory costs rise when additional
brands are stocked, it would be inter-
esting to know how much they rise,
and how many pharmacists actually
stock *all* brands—of, say, ampicillin
or tetracycline—or how long they
keep "slow moving" products on their
shelves before they are returned for
credit. To ask that the industry elimi-
nate multiple sources is to ask com-
petitors to stop competing.

Drug Substitution—A License for the Unethical

Anti-substitution repeal would
favor "corner cutting" pharmacists
and manufacturers. For them, free
substitution would be not a right, but
a license. As an aftermath, it is quite
likely that the confidence of both phy-
sicians and patients in the profession
of Pharmacy would be eroded, as
revelations about the unconscionable
behavior of an undisciplined few were
magnified in the press or in profes-
sional circles.

Summary

In short, what the American
Pharmaceutical Association advo-

cates as a broad-spectrum panacea
looks to us to be not only a minority
view (advocacy of substitution is by
no means a uniform policy in Phar-
macy), but also an extraordinarily
costly and ineffective remedy, whose
side effects are odious. We believe
(1) that an impressive majority of
pharmacists prefer to work with
Medicine and with industry, for the
consumer, and for the general good,
(2) that they seek the privilege to sub-
stitute when the patient might gain
and when the patient's doctor agrees,
and (3) that they seek to work for the
resolution of genuine grievances
openly and professionally.

*(For amplification of PMA views,
please write for our booklet, "The
Medications Physicians Prescribe:
Who Shall Determine the Source?"
It is available from: Pharmaceutical
Manufacturers Association, 1155
Fifteenth Street, N.W., Washington,
D.C. 20005.)*

Pharmaceutical
Manufacturers Association
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Washington, D.C. 20005




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7 1/2 mg. 

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Jim Watson

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THINK OF
Panwarfin

ABBOTT

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2 mg.

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742 010

President's Letter



A LARGE PAIR of shoes is hard to fill, especially with small feet and more especially if the shoes are those of George Martin. He trod a mighty path as President of our venerable and honorable State Medical Association. To the task of leading us and representing us, he brought cool wisdom, admirable dignity and a wealth of experience serving the several medical groups he held in such high esteem.

To the people of his northwestern Minnesota community, he is a highly capable physician. The dedication and service he renders to them has been matched by the love he expresses for his profession in selfless leadership. For all of us his generosity to his family, his patients, and his colleagues should be a model.

Though his steps will be difficult to follow, let's hope that his successors will be able to muster the strength to at least try and especially, let's hope that this successor will be able to serve you in part with the skill and grace that he did.

Walter Lippmann said it well in his eulogy to Franklin Delano Roosevelt:

"The final test of a leader is that he leaves behind him in other men the conviction and will to carry on."

George did that—so let's have at it! May we keep in mind the debt we owe him for his service in our cause and express our gratitude by contributing as he does in the rank of our State Medical Association.

President
Minnesota State Medical Association

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Sterilization of Women

A Review of New and Potentially Reversible Techniques

JOHN J. SCIARRA, M.D., Ph.D.*

THERE HAS BEEN a resurgence of interest in sterilization as a method of fertility control, especially as advances in bio-engineering technology hold out the possibility of reversible or temporary methods of sterilizing both men and women. This paper will concentrate on various methods of sterilizing fertile women, emphasizing new and experimental techniques, many of which may be reversibly reversed.

The structural diversity of the female reproductive system offers a number of different sites at which sterility can be produced. There are three types of such intervention: surgical, mechanical, and chemical. Some type or combination of types has been applied to almost every site.

This review will begin at the most distal site (the ovary) and move proximally down the reproductive tract to the uterus itself. One does not ordinarily think of the ovary as the site for sterilization. Oophorectomy and radiation castration have been used on occasion for sterilization purposes, but neither of these procedures is recommended, and they are now of purely historical interest. However, there is one technique of sterilization that depends on the mechanical obstruction of the ovarian surface. This is called ovariectomy.¹

Ovariectomy is the procedure by which the ovary is covered by a silastic pouch, which is then sutured to the supporting ligament. The ovary and its silastic envelope are buried within the broad ligament. Although follicles continue to develop and be released, the pouch prevents them from entering the fallopian tube. This technique has been applied to only a small series of patients. The original series of six women has now been followed

one to three years, and no complications have appeared. Biphasic basal body temperature charts indicate that these patients are ovulating normally; but no patient has had the procedure reversed.² The obvious disadvantage of this imaginative procedure is that laparotomy is required for placement of the silastic envelope and for its removal.

Fallopian Tubes

The next site for intervention is the fallopian tubes. By far the majority of sterilization procedures described in the literature involve the fallopian tubes. Most of the techniques currently under investigation are directed to the tubes or to the area of the uterotubal junction. Procedures will be discussed that relate to three anatomical areas:

1. the infundibulum and fimbriae;
2. the ampullary portion of the tube; and
3. the interstitial portion of the tube and the uterotubal junction.

An experimental technique effective in rabbits is fimbriectomy, the application of a silastic cap or hood to the fimbriated ends of the oviduct.³ In the laboratory, caps were affixed to the ipsilateral oviducts of rabbits. Several of the animals conceived through the contralateral oviduct, demonstrating that no extensive peritoneal reaction results from the procedure. After removal of the cap, animals conceived through the oviduct to which it had been applied. This technique has excellent potential for reversibility, although like ovariectomy, it necessitates laparotomy.

Many investigators have suggested the placement of intraluminal occlusive beads or devices as a method of reversible tubal sterilization. One such experimental technique that has been suggested for fimbrial obstruction is a notched teflon plug.⁴ This plug could be inserted by culdoscopy or laparoscopy. Studies on animals have demonstrated minimal tissue reaction with the plug in place. One-third of the animals became pregnant

*Professor and Head, Department of Obstetrics and Gynecology, University of Minnesota Medical School, Minneapolis, Minnesota. This manuscript prepared with the technical assistance of Martha Roth, A.B.

Portions of this paper were used in a presentation to The Second International Conference on Voluntary Sterilization, Geneva, Switzerland, February 28, 1973.




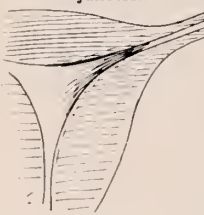

STERILIZATION OF WOMEN—SCIARRA

after removal of the oviductal plugs. This technique, like all others involving precise implantation, has the disadvantages of abdominal and/or vaginal surgery and the associated operative morbidity.

Many authors have reported techniques of temporary sterilization. Perhaps the most widely known was described years ago by Aldridge. In this operation the surgeon makes an incision in the broad ligament and inserts the fimbriated end of the tube, then closes the incision. The Aldridge

method is today only of historical interest, because although reversible, it was found to have significant failure rate. It also required major abdominal surgery.

The most effective surgical technique for sterilization that can be applied to the infundibulum of the fallopian tube is fimbriectomy, or amputation of the distal one-third of the tube. Partial or complete salpingectomy is an effective surgical procedure, which merits mention in any discussion of operative sterilization techniques.

STRUCTURE	METHOD	MECHANISM	REVERSIBILITY	DEVICE OR PROCEDURE
 Ovary	Oophorectomy	Surgical excision	No	Laparotomy
	Ovariectomy	Mechanical obstruction with silastic pouch	Yes?	Laparotomy
 Tubal infundibulum	Fimbriectomy	Surgical excision	No	Laparotomy or culpotomy
	Fimbriectomy*	Mechanical obstruction with silastic cap	Yes	Laparotomy
	Fimbrial plug*	Mechanical obstruction with notched teflon plug	Yes	Laparoscopy
	Aldridge procedure	Surgical burial	Yes	Laparotomy
 Fallopian tube	Salpingectomy	Surgical excision	No	Laparotomy or culpotomy
	"Ligation"—various procedures	Surgical interruption	No ⁺	Laparotomy or culpotomy
	Nonsurgical occlusion	Electrocautery	No?	Laparoscopy or culdoscopy
		Electrocautery with transection	No	Laparoscopy or culdoscopy
		Cryosurgical cautery	No ⁺	Laparoscopy or culdoscopy
		Application of clips	Possible	Culdoscopy or laparoscopy
 Utero-tubal junction	Nonsurgical destruction of ostia	Chemical sclerosis with e.g. quinacrine	Unknown	Transcervical blind delivery, positive pressure
				negative pressure
	Tissue-adhesive or other plugs	Mechanical obstruction	Yes?	Hysteroscopy
				Blind delivery [‡]
 Uterus	Hysterectomy	Surgical excision	No	Abdominal or vaginal
	Endometrial destruction	Chemical sclerosis with e.g. quinacrine*	Unknown	Transcervical delivery
		Cryosurgical ablation	Unknown	Uterine cryoprobe
	Timed release of drug	Chemical sclerosis of tubal ostia	Unknown	Intra-uterine device as carrier for drug delivery system [‡]

* Method used only on experimental animals, to date

+ Procedure not designed for reversibility; possibility of reversal after 2nd surgical procedure

‡ Suggested possibility

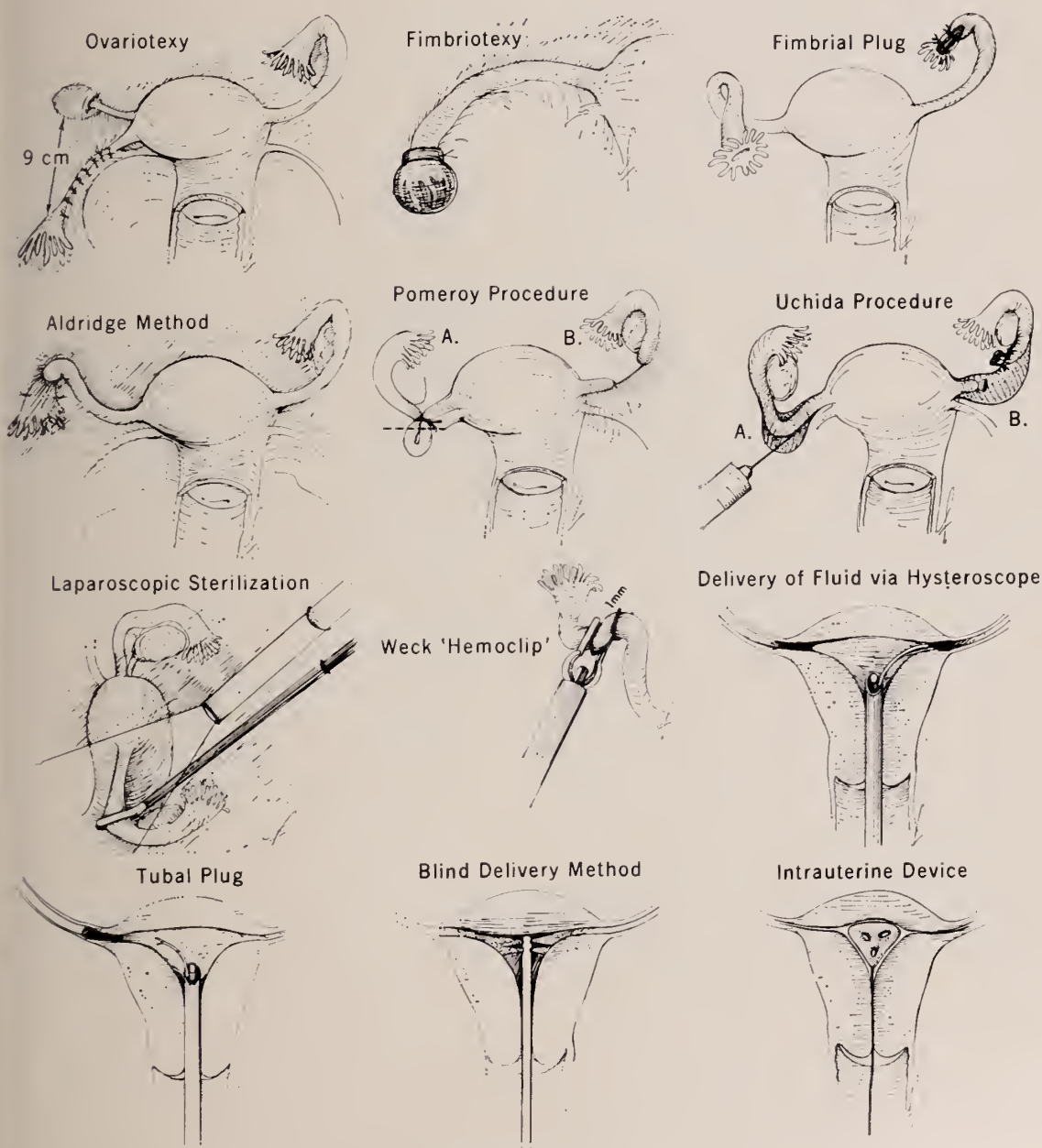
Figure—Left

As was stated earlier, most sterilization techniques, present and past, are addressed either to the ampullary portion of the tube or to the uterotubal junction. Most of these methods are surgical. The Pomeroy technique of tubal sterilization is perhaps the commonest. The surgeon lifts a loop of tube; he then ties a plain catgut absorbable suture around the base of the loop, creating a knuckle; and then cuts across the knuckle, removing a segment of tube. As the suture material is absorbed, the normal tension of the broad liga-

ment pulls the cut ends of the tube apart.

There are many other surgical techniques of tubal sterilization and the technical details of most are well known. However, one of the newer procedures, described by Uchida,⁵ will be discussed.

In the Uchida procedure, the serosal surface of the tube is dissected away from its muscular portion, facilitated by the injection of saline-adrenalin solution to produce serosal ballooning. The saline-adrenalin injection also produces vascular spasm,



Figure—Right

permitting a bloodless dissection. The muscular tube is brought out through the cut serosa and transected; the proximal end of the cut tube is then stripped back and excised, and the distal stump is ligated and remains within the serosal balloon. The edges of the serosal incision are then gathered in a purse-string ligature, tied around the muscular limb of distal tube, and allowed to project into the abdominal cavity. In 1961, Uchida reported no failures in a series of nearly 5,000 patients on whom he performed this operation, but there has been no confirmed follow-up.

Wood² has developed a surgical procedure of considerable delicacy which he terms "atraumatic mid-ampullary sterilization," which may provide a good chance for surgical reversibility. It comprises the division of the wide, ampullary portion of the tube between the main blood vessels that supply it, followed by suture of the cut ends with no excision of tissue. The medial end is buried in a pocket cut in the mesosalpinx, which is then sutured closed over it. The extent of this operation makes it applicable to only a small number of patients. It is, however, potentially reversible with a second operation.

A large number of interval sterilization procedures performed today in many countries, including the USA, are carried out by either laparoscopy or culdoscopy, by means of electrocoagulation with or without accompanying tubal transection. This is an excellent procedure for sterilization; it is effective and has a relatively low rate of associated complications. The complications of this procedure which have been described are: (1) those related to general anesthesia, (2) those related to intra-abdominal hemorrhage, and (3) those related to electrical or thermal damage to intra-abdominal structures such as the small intestine. Laparoscopic sterilization may be done under regional or local anesthesia.

Simple laparoscopic electrocoagulation may be the commonest interval tubal sterilization procedure done in the USA today. Its effectiveness is directly related to the amount of tissue destroyed. If sufficient tissue is destroyed, recanalization is rare. Transection with destruction of the proximal tube also is a very effective method of sterilization.⁶

Other methods of endoscopic sterilization are cryocautery, with and without transection, and the application of metal hemoclips to the fallopian tubes. Because of its simplicity, tubal clipping

seems promising to many investigators. In theory it should be possible for these clips to hold the tubes closed without crushing them. In practice, however, sufficient tubal patency may remain for a pregnancy to occur.

Investigators are currently interested in refining this method. Gutierrez Najar⁷ suggests using two clips at each site rather than one; the tubes are placed 1 mm apart to prevent the hydrosalpinx that develops when they are more widely separated. Others have suggested changing the relative positions of the clips or the type of metal. A major concern associated with this procedure is the possibility of ectopic pregnancy, as reported recently by Neuwirth and associates.⁸ It is potentially an excellent reversible method.

Several procedures have been developed that are directed to the interstitial portion of the tube and the uterotubal junction. Excision of the cornual area has been used by some as a sterilization procedure. More recently, instillation of a sclerosing agent such as quinacrine, formalin, or paraformaldehyde, into the fallopian tubes at the uterotubal junction, is a method that various investigators have found to be successful. This technique lends itself to various delivery systems. Solutions may be instilled transcervically without anesthesia or by the use of either laparoscopic or hysteroscopic visualization.

The technique of hysteroscopy has become much more precise since the development of fiberoptics. In addition, the use of dextran as described by Edström and Fernström⁹ provides for greatly improved visibility. Quiñones and his colleagues have performed tubal electrocautery under hysteroscopic visualization and have found it to be a promising method.

The refinement of hysteroscopy has also led to some interesting experimental designs which use mechanical blocking agents applied to the uterotubal junction or, through the interstitial portion of the tube, to the lumen of the proximal ampulla. Some of these involve tissue adhesives which can be introduced in liquid form and which, as they rapidly solidify, constitute plugs that conform exactly to the shape of the passage they are blocking. One experimental proposal is for the development of a microporous interface which could be applied to the proximal end of the fallopian tube. Such a microporous plug would act as a differentially permeable membrane, permitting passage of fluid from the tubes into the

us but blocking entrance of sperm. These plugs could be removable.

Hysteroscopy, however, remains a sophisticated technique, even when performed under local anesthesia. Some current clinical research is directed at developing a transcervical method that would allow intervention at the uterotubal junction without requiring a high degree of training and skill from the operator. Zipper and his colleagues¹¹ have devised a blind transcervical delivery system for the injection of quinacrine to provide chemical intraluminal tubal sclerosis. The method is simple but requires several applications for maximum effectiveness.

An experimental transcervical technique of interest is that proposed by Thompson and co-workers.¹² This technique involves a curved, bent cannula which delivers a sclerosing agent into the cornual area of the uterus. This is done by blind manipulation. These investigators have also used a contrast-pressure technique, in which the uterine cavity is occluded by a small closed rubber balloon at the tip of a cannula, which is filled with CO₂ under pressure. The tip of the cannula is left open and through it the sclerosing agent is introduced at lower pressure into the lumen of the fallopian tube. These investigators and others are working to refine methods of blind delivery with such devices.

Finally, techniques directed to the uterus will be considered. Hysterectomy continues to be a widely used method of sterilization, especially when it is carried out vaginally. But other methods are also being addressed to the uterus. Zipper and Insunza have experimented with intra-uterine stillation in rats and rabbits of a variety of compounds, including quinacrine.¹³ Clinical experiments noted earlier have shown the destructive effect of quinacrine on tubal tissue. Sterilization by means of chemical ablation of the endometrium might be adaptable to use by paramedical personnel in large populations.

Cryosurgical ablation of the endometrium is now being studied as a means of sterilization. The extensive area to be frozen renders the procedure time-consuming, and the apparatus and its use are sophisticated. Injection of super-cooled liquids

might provide an alternative type of cryo-ablation. These procedures are currently under investigation by Droegemueller and his co-workers.¹⁴

A modality that appears most promising for use in large populations in the near future is the use of intra-uterine devices for controlled release of drugs, which could produce sclerosis of the tubal ostia and the interstitial portions of the tubes. There is an experimental device, developed by Tecna, Inc., (Emeryville, California), that can be inserted easily into the uterus. It contains channels which may be injected with fluid through the inserter. Such an IUD could have a drug compartment for the timed release of a sclerosing agent like quinacrine, as suggested by Butler.¹⁵ This could produce occlusion of the uterotubal junction and sclerosis of the upper uterine fundus. The advantage of such an engineering development would be preservation of the endometrium in the lower fundus, a feature which could make this sterilization technique more acceptable to many women.

Summary

Several portions of the female reproductive system have been the target of some method of sterilization, actual or experimental. The ovary can be removed, buried, or covered with a silastic obstruction; the infundibulum can be amputated, buried, plugged, or capped; the ampullary portions of the tubes can be removed, cut, tied, shortened, buried, burned, or frozen; the uterotubal junction can be scarred closed or plugged; and the uterus can be removed, frozen, scarred, or rendered mysteriously inhospitable.

A variety of assaults on the reproductive system have been described. No one technique is ideal for all women in all clinical or cultural situations, therefore, the research continues, for simpler techniques and for potentially reversible methods.

The fact that there is a resurgence of academic and research interest in sterilization of women is encouraging. Hopefully, it will continue, so that a safe, easy, effective, reversible, inexpensive procedure will be available to all women who desire sterilization.

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5. -15. See page 479.

Copper Seven Intrauterine Device

Clinical Experience

HARRY FOREMAN, M.D.*

THE USE OF INTRAUTERINE devices (IUD) to prevent conception has undergone successive waves of enthusiastic advocacy followed by periods of discouragement and disparagement when clinical experience has failed to bring out initial high expectations. Following a 30-year period of neglect and even condemnation, the use of the IUD underwent a remarkable revival during the 1960's when advances in technology permitted the fabrication of coiled plastic devices which could be straightened for insertion through tubes to be passed through the undilated cervix and then regain a space-filling configuration within the fundus. Because such devices could be produced simply and inexpensively, could be inserted by paramedical personnel trained in a relatively short time, and because they had the potential for remaining in place for months and years due to their inertness to tissue, there were high hopes that this method could be the near ideal contraceptive for use in bringing down fertility rates sharply in the lesser developed countries of the world. Unfortunately, extensive experience in Taiwan, Singapore, India, Thailand, etc., failed to bear out these expectations. Even though many different shapes and sizes were devised and used, the high frequency of side effects, uterine cramps, menorrhagia and expulsion, resulted in a disappointingly low retention and continuation rates, and the IUD again lost popularity.

Nonetheless, the IUD potentially remains a desirable contraceptive method, so active research to develop devices to alleviate or at least minimize the side effects has continued. Currently the most promising results appear to lie with devices which have incorporated into the plastic "active" chemicals which slowly release and act locally to contribute to the contraceptive efficacy of the devices. Among these are the progesterone loaded devices

of Horne, Scott and Underwood,⁴ and the so-called "copper T" and "copper 7" of Tatum and Zipper.¹¹ The latter, the subject of this report, consists of a 7-shaped device formulated from a copolymer of polypropylene and polyethylene which has thin copper wire (0.2 mm diameter and 32 mm in length) with a surface area of approximately 200 mm² wound around the stem. Barium sulphate is incorporated into the plastic to make it radio-opaque.

History of the Copper 7

The enhancement of contraceptive efficacy by the addition of copper to intrauterine devices was first demonstrated by Zipper et al. (1969) when these investigators discovered that copper prevented implantation of the fertilized ovum in the rabbit. These findings were later demonstrated in other animal species (Chang and Tatum²). Zipper et al.¹¹ in 1971 confirmed the potent contraceptive action of copper in humans in a study using a copper-wound T-shaped device. They also found that continuation rates were markedly better than reported for previously used devices by virtue of a reduction in uterine cramps, bleeding and expulsion rates.

Insights into the mechanism of action of copper were provided by Chang and Tatum² in studies on rats and rabbits where it was demonstrated that intrauterine copper renders the endometrium inhospitable to the blastocyst and therein prevents implantation. Blastocysts already implanted are not affected by insertion of copper into the uterus. Studies of serum and endometrial copper levels indicate no systemic absorption of copper (Zipper¹⁰). A cycle-related, localized activity of the copper is suggested by the demonstration of copper incorporated into the endometrium primarily during the progestative phase of the cycle (Medel et al.⁶). Loewit⁵ found that copper salts as well as

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articulate metallic copper are spermatodepressive and at high concentrations, spermatocidal. Metallic copper, like most other intrauterine foreign bodies, evokes a marked mobilization of leukocytes throughout the endometrium and into the endometrial cavity (Cuadros and Hirsch³). It is reasonable to assume that the effects of metallic copper described above contribute either indirectly or collectively to its contraceptive action.

Normal fertility was found to be restored very quickly after removal of the copper from the uterus in rats and rabbits (Medel et al.⁶) and the removal of the device in humans for planning pregnancy was followed by normally expected pregnancy rates through the first trimester after extraction (Zipper et al.¹⁰).

Clinical Experience with the Cu7

Clinical experience with the Cu7 has been reported from Britain and the United States. The British, Newton, Elias and McEwan,⁷ report on 196.5 months of use by 342 women of "Gravidard," a Cu7 device manufactured and sold by the G. D. Searle Company. They found the device remarkably easy to insert. Insertion side effects decreased from 27% in the first month to 3% in the third month. The first expulsion rate per 100 users was 6.67, the accidental pregnancy rate, .08, and removal for medical reasons, 2.95, for the period they are reported (nine months). These findings compare very favorably to usage of the Lippes Loop under similar circumstances. They found the expulsion rate to be related to the care taken during insertion. The successful use of this IUD in the nulliparous woman (the first IUD that truly has exhibited this utility) represents a major addition to the armamentarium of contraception.

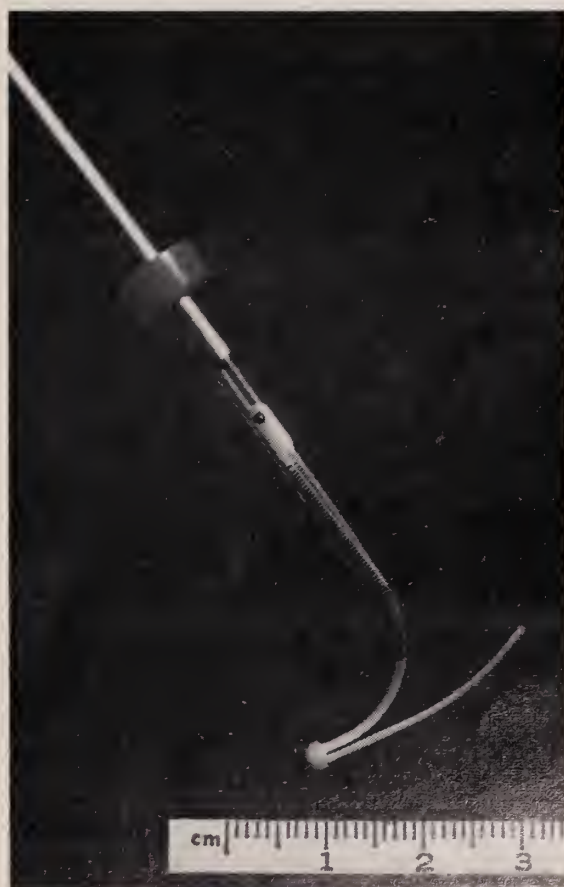
The American experience is reported by Bernstein, Israel, Seward and Mishell¹ using an experimental device supplied by Searle & Co. The study included 186 patients for a total of 1693 woman months. Fifty-nine percent of the women were nulligravida or nulliparous. They found insertion simple and non-traumatic. There were 1.1 pregnancies per 100 women for the first year of use. Expulsion rates were 4.1 per 100 users. Two of the six expulsions took place within six days of insertion suggesting inadequate intrauterine placement of the device. Removal rate for medical reasons (largely excessive bleeding and/or cramping) was 12.4 per 100 woman-years. In this study also,

the device was well tolerated by the nulliparous women.

The Minnesota Studies

The Minnesota studies are part of the Clinical Trials set up by Searle and Company in 1970 to provide information on the clinical experience with the Cu7 that could be submitted to the F.D.A.* The device that was inserted is the now standardized model: 35.9 mm long and 28 mm wide and wrapped with a length of copper which provides 200 mm² of surface area (Figure). The largest outside diameter of the folded device is 2 mm.

Patients were enrolled in two principal periods, during December-January of 1970-1971 and during January of 1972. Regular follow-up visits were required at one, two, three, six, twelve, and eighteen months post insertion (and every six months thereafter). At 18 months the devices were removed from some randomly selected patients, and a new one was inserted. In the remaining cases the devices are to be removed at 30 months post insertion. The removed devices are sent to Searle & Co. for their examination and study.



Figure

*We are indebted to G. D. Searle & Company for providing the devices and financial support for the study.

This study reports on the experience to date (January 30, 1973) with patients from five sources with somewhat differently structured populations. These included four clinics: (A) a University gynecological clinic staffed by residents, (B) a group serving private patients staffed by highly experienced gynecologists, (C) a Planned Parenthood clinic staffed by physicians of varied experience, and (D) a large county hospital gynecological clinic served by residents, and (E) the private office practice of a Board-Certified gynecologist.

Results (presented in Tables 1, 2, and 3)

Characteristics of the Populations

The study encompasses 2152 woman months of IUD use by 156 women from the five sources reporting. The ages and parities of the women served of the population sources are shown in Table 1. The women ranged in age from 18 through 40, although there were only three women in the 36-40 year old age group. By and large, the study population was a young group. Over 70% of patients were below 25 years, and 20% were below 20 years. Sixty-six percent of the group below 20 and 50% of the group below 25 were nulliparas. In view of the interest of an IUD suitable for use by the nullipara and the nature of the population reported here, the experience for the nulliparous women is broken out separately for analysis. The data were calculated by the life-table method of analysis (Potter⁸).

Pregnancies

A total of six unplanned pregnancies resulted: three occurring between 12-18 months of exposure, one at 20 months, and two in the 24th month. Since there were no pregnancies in the first year the failure rate for that time was zero. The clustering of three pregnancies during the second year yielded a cumulative of 2.04 per 100 nulliparous users and 4.99 for 100 users for both types of patients. Two were ectopic pregnancies, both in the 13-18 month period. One of them was to the only nullipara who became pregnant.

Expulsions

A total of 16 expulsions occurred, and these patients were dropped from the study. Most of them occurred during the first three months, five of them within five weeks of insertion. There was only one expulsion during the second year. The expulsions were equally distributed between the nulliparas and multiparas. The nulliparas who lost

their devices did this early, mostly within the first two months. There were no expulsions in the group after six months of use. The multiparas lost theirs throughout the entire period. The net result was that at the end of the first year the expulsion rate for the multiparas was 11.02 and for both groups, 10.09 per 100 users, with the same cumulative rate for the two years' experience.

Removals for Medical Reasons

It was necessary to have 23 devices removed for medical reasons, largely because of bleeding and pain. Other medical reasons included heavy vaginal discharge, a suspicious pap smear, and removal at surgery for a non-gynecological problem. The removals were more or less uniformly distributed over the whole period of the study and more or less equally divided between the nulliparas and the multiparas. The cumulative drop-out rate for medical reasons for 100 nulliparas use at the end of the first year was 10.14, similar to that for the whole group, 11.09. The cumulative drop-out rates for two years were also similar, namely, 16.0 per 100 users.

Removal for Personal Reasons

Most removals for personal reasons were for planning pregnancy, a total of eight. One device was removed because the woman planned a tubal ligation, another because her husband had had a vasectomy, and a third because the patient wished to have a Dalkon Shield inserted.

Lost to Follow-up

A small percentage of women (11 total) were lost to follow-up largely because of their leaving the area. The experience while they were under observation is included in this study.

End of Study

In keeping with the original protocol, the devices were removed for examination from the women selected randomly at the end of 18 months. These women were dropped from the study since no new devices were inserted.

Discussion

This is a first, and in a very real sense, preliminary report on an ongoing study. The experience is limited both in the number of women involved and in duration of time, but in view of the great interest in the copper 7—particularly for use by the young nullipara and the scarcity of data currently available—we are taking this opportunity to share our experience at this time. The principal value of our analyzing and reporting our data at this time is that on the basis of our findings

INTRAUTERINE DEVICE—FOREMAN

TABLE 1
Patient Population Characteristics
(by parity and age)

Patient Source		A			B			C			D			E			Totals
Age	No. %	Null.	Mult.	Tot.	Null.	Mult.	Tot.	Null.	Mult.	Tot.	Null.	Mult.	Tot.	Null.	Mult.	Tot.	
15-20	No. %	7 (87)	1 (13)	8	1 (50)	1 (50)	2	5 (62)	3 (38)	8	9 (64)	5 (36)	14	0 (100)	1	1	33
21-25	No. %	14 (82)	3 (18)	17	2 (17)	10 (83)	12	4 (27)	11 (71)	15	7 (32)	15 (68)	22	6 (50)	6 (50)	12	78
26-30	No. %	2 (33)	4 (67)	6	1 (17)	5 (83)	6	0 (100)	5	5	3 (33)	6 (67)	9	2 (33)	4 (67)	6	32
31-35	No. %	0	1 (100)	1	1 (50)	1 (50)	2	0	2 (100)	2	2 (40)	3 (60)	5	0	0	0	10
36-40	No. %	0	0	0	0	0	0	0	1 (100)	1	0	0	0	0	2 (100)	2	3
Totals	No. %	23 (72)	9 (28)	32	5 (23)	17 (77)	22	9 (29)	22 (71)	31	21 (42)	29 (58)	50	8 (38)	13 (62)	21	156
		Total Nulliparous						66 (42)									
		Total Multiparous						90 (58)									
		Total						156 (100)									

TABLE 2
Events by Parity, Type, Months of Use, and Woman-Months of Use

	end of 1st month	end of 2nd month	end of 3rd month	4-6 months	7-12 months	13-18 months	19-24 months	Totals
Pregnancies								
nulliparous	—	—	—	—	—	1	—	1
multiparous	—	—	—	—	—	2	3	5
total	—	—	—	—	—	3	3	6
Expulsions								
nulliparous	4	2	—	1	—	—	—	7
multiparous	1	2	1	2	2	1	—	9
total	5	4	1	3	2	1	—	16
Medical Reasons								
Bleeding/Pain								
nulliparous	1	1	1	3	1	2	2	11
multiparous	1	3	—	1	4	1	1	11
total	2	4	1	4	5	3	3	22
Other Medical								
nulliparous	—	—	—	—	1	—	—	1
multiparous	—	—	—	—	—	1	1	2
total	—	—	—	—	1	1	1	3
Personal Reasons								
Planned Pregnancies								
nulliparous	—	1	—	—	1	—	—	2
multiparous	—	—	—	1	1	2	2	6
total	—	1	—	1	2	2	2	8
Other Personal								
nulliparous	—	—	1	—	—	—	1	2
multiparous	—	1	—	—	—	—	1	2
total	—	1	1	—	—	—	2	4
Lost to Follow-up								
nulliparous	—	—	2	2	1	—	—	5
multiparous	—	—	—	2	1	4	—	7
total	—	—	2	4	2	4	—	12
End of Study Loss								
nulliparous	—	—	—	—	—	—	1	1
multiparous	—	—	—	—	—	2	1	3
total	—	—	—	—	—	2	2	4
Woman-Months of Use								
by months	153	149	136	122	104	51	37	
cumulative	153	302	438	815	1478	1888	2152	

far, we are encouraged to continue to recommend the use of the Cu 7 in the nullipara.

We have limited our calculations and analysis to gross events particularly pertinent to the utility and efficacy of the device, namely, terminations due to accidental pregnancy, expulsions, and removals for medical reasons. In a later, final report we will include calculations yielding such information as net cumulative termination and continuation rates.

In considering the accidental pregnancies, it is worthy to note that there were no pregnancies during the first year. Such perfect experience is favorable, of course, compared with other reports for the first year of the copper 7 use of Bernstein, et al.¹ and Newton, et al.⁷ The pregnancy rates per 100 users for the two years can be compared to those reported for other devices for the same period, namely, 3.3 for the large Spiral and 5.1 for the Lippes Loop D (Teitze and Lewit⁹), versus 4.99 for all of our Cu 7 users and 2.04 for the nulliparous users.

The devices were in place in all of the women who had conceived. The device was removed from one of them at the time conception was recognized, but the pregnancy was not disturbed.

That two of the six pregnancies were ectopic is noteworthy, certainly a much higher rate than might be expected (Teitze calculates an expected rate in normal women of about one per 1,000) but this finding must be considered in the light of subsequent experience before its significance can be judged.

Three out of the four intrauterine pregnancies occurred late in the two year period, a fact which might be indicative of the loss of effectiveness of the device when much of the copper has been eluted from it due to tissue interaction.

Expulsion rates (10.09) were not nearly as favorable as those reported by Bernstein (4.01), but were comparable to those found by Newton (9.06) and the Lippes D (26.7). This can be considered a favorable experience, particularly in view of the high proportion of nulliparous women in our study. For these women the expulsion rates dropped essentially to zero after the first two months of use.

The rate of removal for medical reasons was favorable, 11.09 per 100 users, as compared to the Lippes Loop D (15.2) and all sizes of devices in the never pregnant women (17.3) (See Teitze and Lewit⁹).

TABLE 3
Gross Monthly and Cumulative Rates of Events Pertinent to the
Efficacy of the Device by Type of Termination per 100 Uses

Events	end of 1st month	end of 2nd month	end of 3rd month	4-6 months	7-12 months	13-18 months	19-24 months
Pregnancies							
Rate by Months							
nulliparous	—	—	—	—	—	2.04	—
multiparous	—	—	—	—	—	2.82	4.55
both	—	—	—	—	—	2.50	2.50
Cumulative Rate							
nulliparous	—	—	—	—	—	2.04	2.04
multiparous	—	—	—	—	—	2.82	7.23
both	—	—	—	—	—	2.50	4.99
Expulsions							
Rate by Months							
nulliparous	6.24	3.38	—	1.89	—	—	—
multiparous	1.11	2.33	1.19	2.44	2.63	1.43	—
both	3.24	2.76	0.07	2.22	1.57	0.09	—
Cumulative Rate							
nulliparous	6.24	9.43	9.43	11.05	11.02	11.02	11.02
multiparous	1.11	3.41	4.57	7.99	9.44	10.74	10.74
both	3.24	5.92	6.59	8.66	10.09	10.86	10.86
Removal for Medical Reasons							
Rate by Months							
nulliparous	1.63	1.72	1.75	5.45	1.92	3.92	4.08
multiparous	1.11	3.45	—	1.24	5.13	2.86	1.538
both	1.32	2.76	0.07	2.94	3.85	3.30	2.63
Cumulative Rate							
nulliparous	1.63	2.36	4.07	9.29	10.14	13.66	16.32
multiparous	1.11	4.52	7.82	8.96	13.63	16.10	17.34
both	1.32	4.05	4.73	7.69	11.09	14.03	16.29

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"To Doctor Empirick"

When men a dangerous disease did scape,
Of old, they gave a cock to *AEsculape*.
Let me give two: that doubly am got free,
From my diseases danger, and from thee.*

*Ben Jonson: Epigrammes, 1616.

Squamous Cell Carcinoma of the Head and Neck*

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and KOMANDURI CHARYULU, M.D.‡

DURING THE PAST FIFTEEN years improvement in surgical techniques especially related to reconstruction and the use of Cobalt irradiation have provided a more effective potential in treatment of patients with head and neck cancer. In the late 1950's various centers began to initiate preoperative irradiation followed by a definitive planned surgical procedure. Powers¹ reported significant histologic changes in pathology specimens when as little as 1,500 to 3,200r of preoperative irradiation doses had been given. Biller, Davis, and Powers² reported on the survival rates of two different groups of patients with laryngeal/laryngopharyngeal cancers. One group received planned preoperative irradiation, 1,500r to 3,000r over a two to three-week period; and one group received no preoperative irradiation. They noted a difference in the survival rates which depended upon the anatomic area treated. The incidence of complications following surgery was not increased by this amount of irradiation.

In 1970, Goldman³ reported the results of fifty-five patients treated with combined therapy, utilizing

5,500 rads of Cobalt 60 over a six-week period followed by surgery. He showed an improved prognosis with this regime. Specific surgical techniques were utilized with this dosage to provide carotid artery protection.

While others have discussed theoretical benefit of preoperative irradiation followed by surgery only now have significant numbers of patients been treated by this method so that large series of results can be reported. There are still important questions which need to be answered. Does the preoperative irradiation actually alter the survival rate? Is there a lesser evidence of local recurrence? What is the optimal amount of irradiation and over what period of time should it be given so that the greatest effect on the tumor cell will occur with the least morbidity? We are reporting our experience on this large series of patients to help contribute in answering these questions.

At the University of Minnesota a prospective pilot study of combined preoperative irradiation and subsequent surgery was launched in 1964. The results of this study, along with the results of other cases managed by individual methods during this period of time, are the subject matter of this paper. The purpose of our review was to

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See editorial, page 513.

TABLE 1
Squamous Cell Carcinoma of the Head and Neck 1959-1969
Primary Treatment at U. of M. and Minneapolis Veterans Hospital

Larynx	212	Oral cavity	
Hypopharynx		Base of tongue	52
Pyriform	55	Palate	11
Post. pharyngeal wall	20	Ant. tongue & floor of mouth	11
Post cricoid	7	Paranasal Sinuses	
Epiglottis	19	Maxillary	35
Pharynx		Ethmoid	4
Lat. and Post. wall	12	Frontal	1
Tonsillar area	96	Ear	10
Nasopharynx	23	Unknown primary	7
Nose	9		
		TOTAL	584

to evaluate our protocols in the light of the analysis of these results.

Materials and Methods

The study groups included only patients whose entire treatment regime was carried out at the University of Minnesota Hospital and Veterans Administration Hospital. Patients who received a portion of their therapy elsewhere or were seen in consultation only were excluded. A diagnostic biopsy of the primary lesion or of a neck metastasis performed elsewhere did not exclude the patient from the study group.

Five hundred eighty-four patients with squamous cell carcinoma at the sites listed in Table 1 provide the group in this study. The subsequent tables will list the breakdown in two and five-year figures on the survival rates of these patients, but only the five-year figures will be used for discussion in the paper. Patients were treated by both the Department of Radiation Therapy at the University of Minnesota Hospital, the Minneapolis Veterans Hospital, and the Department of Otolaryngology between 1959 and 1969. The object of our methods was to accomplish optimal cure rates with minimal loss of function and disfigurement. A survey of adenocarcinoma has previously been reported by two of the authors (Adams and Duvall⁴). Lesions were classified according to the TNM System of the American Joint Committee on Cancer Staging and End Results as reported in 1962.^{5,6} When necessary, retrospective classification was feasible because the charts contained accurate diagrams of the tumors together with written descriptions of the primary lesions and clinically palpable cervical metastases. Patients with nonpalpable cervical metastases who were found at the time of surgery to have metastatic nodal involvement are classified with those patients who did not have cervical involvement. All patients who underwent surgical extirpation had surgery performed in the standard en bloc philosophy, as the

operation was planned prior to the administration of 4,000 rads over three to four weeks followed by the initially planned surgical procedure after a three-week rest period.

Squamous Cell Carcinoma of the Larynx

The largest number of malignant tumors in this series was squamous cell carcinoma of the larynx. Two hundred and twelve patients with squamous cell carcinoma of the larynx were treated as determinate cases. Included are glottic and supraglottic lesions extending to the aryepiglottic folds which seemed clinically to have arisen within the endolarynx. This group includes patients who had subglottic extension. There were no patients presenting with a primary subglottic tumor without involvement of the true cord. The lesions which seemed to have arisen on the epiglottis, post-cricoid area, or pyriform sinus will be discussed separately.

Stage I (T_1N_0)

These patients have a carcinoma of the larynx which is confined to one vocal cord and have normal mobility of that vocal cord. They made up approximately 25 percent of laryngeal carcinomas. There were 50 patients in this group of whom 32 are available for five-year evaluation. Twenty-four of these had irradiation therapy as a primary treatment, and eight patients underwent surgical procedures ranging from extended cordectomy to vertical hemilaryngectomy. The results were excellent in both groups (Table 2). However, four patients among those treated primarily by radiation therapy later developed a recurrence. Two of these patients required a total laryngectomy; two had a partial laryngectomy. One patient underwent a total laryngectomy but died of recurrent tumor. In the surgical group, one patient died of recurrent disease.

Stage II (T_2N_0)

This group includes patients with tumor involving both cords with normal mobility of the

TABLE 2
Squamous Cell Carcinoma of the Larynx T_1N_0 (50 pts.)

Interval	Total # Pts.	Died of Other Cause	Deter- minate	Recurrence Treated by Surgery	Success	Failure	End Results %
				(Radiation)			
2 yrs.*	35	4	31	6	31	0	100%
5 yrs.†	24	0	24	4	23	1	94%
				(Surgery)			
2 yrs.	15	0	15	—	14	1	93%
5 yrs.	8	0	8	—	7	1	87%

*1959-1969

†1959-1966

cords or involving one cord with decreased mobility of that cord (Table 3). There were 51 patients in this group of whom 30 were available for five-year evaluation. It has been our policy to perform a total laryngectomy in cases of fixed cord lesions. An ipsilateral radical neck dissection with hemithyroidectomy incontinuity was done in some cases. T₂ tumors also include those which extend into the anterior commissure. When this finding was present, it was generally an indication for combined therapy. Ten patients with T₂N₀ lesions were managed by surgery only. Three died of other causes, and two died as the result of their disease. The five-year survival rate was 70 percent. Eighteen patients with T₂N₀ lesions were treated with radiation therapy only. Nine of these patients died of other causes. Nine patients who had radiation therapy only, later required surgery for recurrent tumor. Six of these nine survived five years. Persistent edema or limited cord motion following radiation therapy suggested recurrent or persistent tumor.

Both patients who underwent 4,000 tissue rads of Cobalt 60 preoperatively over a four-week period followed by surgery in three weeks survived five years.

Stage II (T₂N₀)

In this group of patients, the tumor extended from a true cord into the subglottic region or on the ventricular band (Table 4). Of the 59 patients in this group, 33 were available for five-year evaluation, the remainder from two to five years. Of the former group, twenty-four had surgery, three had radiation therapy only, and six were treated with combined therapy. Surgery included laryngectomy with ipsilateral neck dissection. Among the 24 patients who had surgery, two died of other causes. Two others died of recurrent tumor. One patient out of the three who had radiation therapy died of other causes. One died of uncontrollable disease. All of the six who had combined therapy are alive and well at five years.

Stage III (T₃N₁)

This group of patients had similar clinical findings to the previous group. However, a palpable cervical node assumed to be a metastasis was present on initial evaluation. Twelve of the patients with T₃N₁ lesions were available for five-year evaluation. Six of these patients had surgery alone, two had irradiation, and four had combined therapy. Two of the six patients who had surgery alone died of other causes, and three died

TABLE 3
Squamous Cell Carcinoma of the Larynx T₂N₀ (51 pts.)

Interval	Total # Pts.	Died of Other Cause	Deter- minate	Recurrence Treated by Surgery	Success	Failure	End Results %
				(Radiation)			
2 yrs.*	27	4	23	2	22	1	95%
5 yrs.†	18	9	9	9	6	3	67%
				(Surgery)			
2 yrs.	17	0	17	—	15	2	87%
5 yrs.	10	3	7	—	5	2	70%
				(Combined)			
2 yrs.	7	0	7	—	7	0	100%
5 yrs.	2	0	2	—	2	0	100%

*1959-1969

†1959-1966

TABLE 4
Squamous Cell Carcinoma of the Larynx T₃N₀ (59 pts.)

Interval	Total # Pts.	Died of Other Cause	Deter- minate	Recurrence Treated by Surgery	Success	Failure	End Results %
				(Radiation)			
2 yrs.*	7	1	6	1	5	1	84%
5 yrs.†	3	1	2	1	1	1	50%
				(Surgery)			
2 yrs.	36	4	32	—	31	1	97%
5 yrs.	24	2	22	—	20	2	90%
				(Combined)			
2 yrs.	16	1	15	—	15	0	100%
5 yrs.	6	0	6	—	6	0	100%

*1959-1969

†1959-1966

current disease. One patient treated by irradiation only died of another cause, and one is alive five years but did require a laryngectomy with neck dissection. Although the number of cases is small, it appears that patients treated by the combined approach with preoperative irradiation and planned surgery have a better prognosis (Table 5).

Stage III (T_3N_2)

Three patients with T_3N_2 tumors of the larynx with fixed or bilaterally palpable metastases died of their disease.

Stage IV (T_4N_0 and T_4N_1)

There were 30 patients with lesions that would fall into the T_4 category. These large lesions extended out of the true larynx into the subglottic or paraglottic areas. Twenty-one of these patients have died, and 20 of these died of their tumor. Three of 12 patients who had radiation therapy alone, were alive two to five years. Among six patients who received planned, combined therapy, five were alive two to five years.

Posterioricoid Carcinoma

The posterioricoid region is the area of the posterior surface of the larynx, and these tumors are classified with hypopharynx carcinomas. By definition, this area extends from the posterior surface of the arytenoid cartilages and their connecting folds to the inferior surface of the cricoid. Laryngectomy is required as part of the treatment of this tumor. The tumor may not be evident on

indirect laryngoscopy. It is found by lifting the larynx anteriorly with the blade of the laryngoscope. The tumor is uncommon in our series and is generally less common in the United States than in certain areas of England and Wales. Many authors feel that a surgical procedure of large magnitude is the only advised treatment for patients with this lesion. A laryngopharyngectomy, hemithyroidectomy, and radical neck dissection are necessary, as well as an additional surgical procedure for reconstruction of a portion of the cervical esophagus. There were only seven cases of this tumor in the ten-year period. There is only one five-year survivor. He had a T_2N_0 lesion treated by irradiation and died from carcinoma of the rectum at ten years (Table 6).

Pyriform Sinus Carcinoma

Patients with carcinoma of the pyriform sinus frequently have metastases when they are first seen. The pyriform sinus should be suspected as the site of a primary tumor when a neck mass is present and there is no apparent primary evident. Small lesions in the lateral pyriform sinus usually metastasize to the deep jugular nodes early in the course of disease even before the patient has significant symptoms.

In our 55 patients treated with preoperative irradiation combined with laryngopharyngectomy, hemithyroidectomy, and ipsilateral neck dissection, a statistical analysis cannot be made from the

TABLE 5
Squamous Cell Carcinoma of the Larynx T_3N_1 (14 pts.)

Interval	Total # Pts.	Died of Other Cause	Determined by	Recurrence Treated by Surgery	Success	Failure	End Results %
2 yrs.*	2	0	(Radiation)		2	0	100%
5 yrs.†	2	1	1	1	1	0	100%
2 yrs.	7	2	(Surgery)		3	2	60%
5 yrs.	6	2	4	—	1	3	25%
2 yrs.	5	0	(Combined)		4	1	80%
5 yrs.	4	0	4	—	3	1	75%

*1959-1969

†1959-1966

TABLE 6
Post-Cricoid Carcinoma (7 pts.)

Stage	# of Pts.	Rad.	Treatment	Survival	Alive 2 yrs.	Alive 5 yrs.	Tumor	Died Met.	Other
T_2N_0	1	1	0	0	1	1	0	0	0
T_2N_1	1	0	1	0	1	0	0	0	0
T_3N_1	3	3	0	0	1	0	3	0	0
T_5N_2	2	2	0	0	0	0	2	0	0

Died 10 yrs. of carcinoma of rectum

data. As Table 7 demonstrates, however, the patient with a large lesion with palpable cervical metastases has a poor prognosis.

Hypopharynx Carcinoma

Tumors in the pyriform sinus and postcricoid area have been discussed. The posterior wall of the hypopharynx is an area that is generally not amenable to treatment by surgery as there is insufficient cleavage of dissection; that is, the lesion ordinarily extends through the prevertebral fascia. There were 16 patients who had tumors of this area, and 15 of these were treated by irradiation therapy. In certain patients during the course of therapy, it was found necessary to reduce

the chance of aspiration pneumonitis by the judicious use of tracheostomy and gastrostomy. Four of the initial patients are still alive, and one patient has survived ten years without tumor. One patient had a small lesion amenable to surgery. He is alive at two and one-half years and requires pharyngeal dilatation.

Epiglottitis

Tumors of the epiglottitis may arise near the tip or on the laryngeal or vallecular surfaces. It is not always easy to determine whether the lesions should be classified with the base of tongue or the larynx. There were 19 patients in whom the tumor was felt to originate primarily on the epiglottitis (Table 8). Among this group of va-

TABLE 7
Carcinoma of the Pyriform Sinus (55 pts.)

Stage	Total # Pts.	Treatment	Alive		Tumor	Died Met.	Other
			2 yrs.	5 yrs.			
T ₂ N ₀	1	Rad.	0	—	—	—	—
		Surg.	1	1	1	0	0
		Comb.	0	—	—	—	—
T ₂ N ₁	4	Rad.	1	0	0	0	1
		Surg.	1	0	0	1	0
		Comb.	2	0	0	0	0
T ₂ N ₂	2	Rad.	0	—	—	—	—
		Surg.	2	1	0	1	0
		Comb.	0	—	—	—	—
T ₃ N ₀	10	Rad.	6	1	0	4	2
		Surg.	3	1	1	0	0
		Comb.	1	0	0	0	1
		Rad.	2	1	0	0	0
T ₃ N ₁	16	recur. surg.					
		Surg.	10	5	3	1	4
		Comb.	4	3	0	1	0
		Rad.	12	2	0	6	0
T ₃ N ₂	22*	Surg.	6	3	1	3	0
		Comb.	1	1	0	1	0

*Three patients received no treatment.

TABLE 8
Carcinoma of the Epiglottitis (19 pts.)

Stage	Total # Pts.	Treatment	Alive		Tumor	Died Met.	Other
			2 yrs.	5 yrs.			
T ₁ N ₀	2	Rad.	0	—	—	—	—
		Surg.	2	2	1	0	0
		Comb.	0	—	—	—	—
T ₂ N ₀	7	Rad.	0	—	—	—	—
		Surg.	4	4	4	0	0
		Comb.	3	3	2	0	1
T ₂ N ₁	4	Rad.	1*	1	1	0	0
		Surg.	3	2	2	0	1
		Comb.	0	—	—	—	—
T ₂ N ₂	1	Rad.	1	0	0	1	0
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
T ₃ N ₀	4	Rad.	1	1	1	0	0
		Surg.	1	1	0	0	0
		Comb.	2	2	2	0	0
T ₃ N ₁	1	Rad.	1	0	0	1	—
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—

*Recurrence treated by surgery.

in sized lesions, only two patients, both of whom had nodal metastases when initially seen, died of the disease. Both patients developed distant metastases. Methods of treatment included both radiation therapy and surgery.

Stomal Recurrence

Stomal recurrence following laryngectomy is a difficult problem. Kveim,⁸ in his study, showed a high correlation of stomal recurrence with preoperative tracheostomies, particularly when done more than a few days prior to the surgical procedure. There were 14 patients with stomal recurrence in this series. Eleven had primary tumors of the larynx and three had primary tumors in the piriform sinus. No direct correlation with preoperative tracheostomy could be made. In addition, there was no direct correlation with subglottic extension. There were thirteen patients who required a tracheostomy more than forty-eight hours before surgery; and nine of these patients died, and two had stomal recurrence. These patients all initially had very large lesions. There were 22 patients with subglottic extensions. Twelve

of these patients have died, and four of these patients had developed stomal recurrence. The single factor which stood out as being common in all cases was the presence of viable tumor in metastatic nodes in the pathologic specimen. Since all patients received an ipsilateral hemithyroidectomy, this was not felt to be a factor in the incidence of stomal recurrence. Only two of the patients with stomal recurrence are still alive without disease, and both are alive more than five years. One patient was treated by irradiation therapy only, and the other was treated by a wide local excision and radiation therapy. The known causes of death of the other stomal recurrences are shown in Table 9.

Squamous Cell Carcinoma of the Base of the Tongue

Tumors of the posterior one-third of the tongue, although classified with oral carcinomas, have a poorer prognosis. This is because of the poor differentiation of these tumors and the rich lymphatic supply which passes through the pharyngeal walls and into the subdigastric nodes. The patients do not seem to develop symptoms until the tumor is greater than two centimeters in size. In most series, over 50 percent of the patients with tumors in this area have palpable cervical metastases when first seen. The New York Memorial series⁹ reported a 15 percent, five-year survival rate among patients presenting with unilateral metastatic nodes, and nine percent survival rate when

TABLE 9
Areas of Metastases in Patients Dying with Stomal Recurrence

- 1 local invasion
- 1 lung
- 1 mediastinum
- 1 mediastinum, pleura, diaphragm, adrenal
- 1 pleura, periaortic nodes, liver, vertebra
- 4 patients died from large artery hemorrhage

TABLE 10
Carcinoma of the Base of Tongue and Vallecula (52 pts.)

Stage	Total # Pts.	Treatment	Alive		Tumor	Died Met.	Other
			2 yrs.	5 yrs.			
T ₁ N ₀	3	Rad.	3	2	1	0	2
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
T ₂ N ₀	14	Rad.	8	6	4	3	0
		Surg.	4	4	1	0	0
		Comb.	2	2	1	0	0
T ₂ N ₁	7	Rad.	4	3	0	1	2
		Surg.	2	1	0	1	0
		Comb.	1	0	0	1	0
T ₂ N ₂	4	Rad.	2	1	0	1	1
		Surg.	1	0	0	1	0
		Comb.	1	0	0	1	0
T ₃ N ₀	5	Rad.	5	1	1*	3	0
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
T ₃ N ₁	11	Rad.	6	2	0	3	0
		Surg.	3	3	1	2	0
		Comb.	2	2	1	0	1
T ₃ N ₂	8	Rad.	7	1	0	5	0
		Surg.	0	—	—	—	—
		Comb.	1	1	1	0	0

*Recurrence treated by surgery.

there were bilateral metastases.

Among the 52 patients treated in our series, eleven are alive at five years, and two others are alive between two and five years (Table 10). Ten patients died from causes other than their tongue cancer; nine from other primaries (stomach, esophagus, parotid, prostate, and lungs). Radiation therapy was either given preoperatively or as the primary treatment. Surgery was reserved for a persistent tumor or for persistent cervical metastases. Irradiation is our preferred method of treatment. Tumors which cross the midline, which is not an uncommon finding, are treated only by irradiation therapy. Laterally located tumors can be treated by surgery. The extensive surgical procedure may include a laryngectomy for prevention of aspiration and/or primary surgical closure.

Tonsillar Area Carcinoma

Next to the larynx, the tonsillar area was the most common site of tumor. The term tonsillar area is used as these tumors are rarely confined to the tonsillar fossa.¹⁰ They extend onto the soft palate, and into the immediately adjacent posterior one-third of the tongue.

During the early part of this series, the treatment was generally irradiation therapy. Surgery was reserved for those patients with recurrent or persistent cervical nodes. Later in this series be-

cause the results were not satisfactory, the plan of management was changed to preoperative radiation therapy followed by surgical extirpation of the primary lesions with the cervical metastases. The original lesion was considered technically resectable. Surgery would involve ipsilateral neck dissection, partial mandibulectomy, and en bloc resection of the primary tumor. This was performed on all patients having a lesion larger than T₂. Excision of a portion of the mandible permitted primary closure in a large number of cases. Flaps were reserved for cases in which this could not be performed without undue tension on suture lines, or by compromising the line of resection.

There were 96 patients with carcinoma in the tonsillar area. In a very advanced lesion, neither surgery alone nor radiation therapy alone provided a satisfactory survival rate (Table 11). Unlike tumors in the base of the tongue where the patients frequently died from another cause, sixty of the patients died as a direct result of their tumor. Sixteen patients are alive between two and five years without recurrence.

Oropharynx Carcinoma

Patients who had tumors arising in the posterior wall of the oropharynx with extension to the lateral walls other than those in the tonsillar area were generally not amenable to treatment by surgery. Radiation therapy has been the only form

TABLE 11
Squamous Cell Carcinoma of Tonsillar Area

Stage	Total # Pts.	Treatment	Alive			Died Met.	Other
			2 yrs.	5 yrs.	Tumor		
T ₁ N ₀	6	Rad.	6	5	2	1	0
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
T ₁ N ₁	8	Rad.	8	3	1	4	1
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
T ₂ N ₀	14	Rad.	13	8	4	6	1
		Surg.	1	1	0	0	0
		Comb.	0	—	—	—	—
T ₂ N ₁	7	Rad.	6	5	1	3	1
		Surg.	0	—	—	—	—
		Comb.	1	1	0	0	0
T ₂ N ₂	5	Rad.	5	2	1	2	1
		Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
T ₃ N ₀	21	Rad.	19	8	4	10	4
		Surg.	1	0	0	1	0
		Comb.	1	1	1	0	0
T ₃ N ₁	27	Rad.	24	7	2	16	4
		Surg.	1	0	0	1	0
		Comb.	2	2	0	0	0
T ₃ N ₂	8	Rad.	7	2	0	5	0
		Surg.	1	1	0	0	0
		Comb.	0	—	—	—	—

treatment in these 15 patients, and four patients are alive at five years. One patient died of other causes, and two patients had another simultaneous primary. These latter two patients have died. The remainder of the patients died as a direct result of their tumors (Table 12).

Squamous Cell Carcinoma of the Nose

There were nine patients with primary squamous cell carcinoma occurring in the nose (Table 13). The majority of these tumors were on the septum. Wide local excision was necessary; and if the tumor extended into the skin of the nose, rhinectomy was done. Although cosmetically a difficult problem, the survival rate was good. When a very wide surgical procedure was necessary, a quite socially acceptable prosthetic appliance was made for the patient. Plastic reconstruction is not a wise choice.

Nasopharynx Carcinoma

Twenty-eight patients (Table 14) with malignant tumors of the nasopharynx were treated during this period. Those patients with squamous cell carcinoma, lymphoepithelioma, or poorly differentiated squamous cell carcinoma are discussed. There appears to be a correlation with the type of tumor and the survival rate in this small series. This is noticeable in the group of patients with lymphoepithelioma. These three patients were in their early 20's and have no evidence of recurrent tumor. One of these patients required an ipsi-

TABLE 13 Squamous Cell Carcinoma of the Nose (9 pts.)		
Location	Treatment	Outcome
Septum	Co ⁶⁰	Died of cardiac problems
Nasal vault	Co ⁶⁰	Widespread metastases
L. Lobule	rhinotomy	Met. to parotid; died after another surg. procedure, free of tumor
Septum	rhinectomy	Free of tumor 3 yrs.
Septum	Excision, radical neck	Free of tumor 3 yrs.
Columella	Excised	Free of tumor 3 yrs.
Septum	rhinectomy	Free of tumor 3 yrs.
Septum	Excised	Free of tumor 11 yrs.
Septum	Excised	Free of tumor 7 yrs.

lateral neck dissection followed by postoperative radiation therapy. He has been active in sports for two years since surgery. There is no evidence of recurrent tumor.

At the M. D. Anderson Hospital,¹⁰ the overall five-year survival for patients with lymphoepithelioma was 35 percent. Many pathologists feel that lymphoepithelioma is a squamous cell carcinoma with lymphocytic elements. In any case, our series showed a predilection for this particular type of tumor in younger individuals.

Treatment of these tumors has always been irradiation therapy. The lymphatic drainage is to the high posterior cervical nodes, the parapharyngeal group of nodes, and to the subdiaphragmatic node. In rare cases, the tumor can metastasize directly to the subdiaphragmatic node without involvement of the higher nodes. In this situation if the primary is controlled and cervical metastases persist, a radical neck procedure can be performed. This is not common. Patients may have involvement of the cranial nerves; usually III, V, and VI.

TABLE 12
Squamous Cell Carcinoma of the Oropharynx (15 pts.)

Stage	Total # Pts.	Treatment	Alive		Tumor	Died Met.	Other
			2 yrs.	5 yrs.			
		Rad.	1	0	—	1	
							Patient had multiple primaries
T ₁ N ₀	1	Surg.	0	—	—		
		Comb.	0	—	—		
		Rad.	2	2	2	0	0
T ₂ N ₀	2	Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
		Rad.	1	0	0	1	0
T ₂ N ₁ M ₁	1	Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
		Rad.	2	0	0	1	0
T ₃ N ₀	2	Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
		Rad.	5	1	1	3	1
T ₃ N ₁	5	Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—
		Rad.	3	1	1	2	0
T ₃ N ₂	3	Surg.	0	—	—	—	—
		Comb.	0	—	—	—	—

T₂

1
With simultaneous carcinoma 25 cm level of esophagus died 8 mos. with widespread metastases

Three of our patients had return of function of these cranial nerves following irradiation therapy.

Palate

There were 11 patients with squamous cell carcinoma confined to the hard or soft palate (Table

15). Treatment of Stage I lesions of the soft palate has been irradiation therapy, and all the patients are alive between two and five years. Radiation therapy was used primarily because of the rich lymphatic drainage of the soft palate; and early involvement of high retropharyngeal nodes

TABLE 14
Malignant Tumors of the Nasopharynx (28 pts.)

Type	Total # Pts.	Presence of Nodes	Alive		Tumor	Died Met.	Other
			2 yrs.	5 yrs.			
Undifferentiated	10	+ 7	3	0	5	1	0
		(-) 3	3	3	0	0	0
		+ 5	3	2	2	0	0
Sq. Cell	7	(-) 2	1	0	2	0	0
		+ 3	3	1	0	0	0
		(-) 2	2	1	0	0	0
Lympho epithelioma	5	+ —	—	—	—	—	—
Transitional cell	1	(-) 1	1	0	0	0	0

Other malignant tumors treated in the same period

Embryonal rhabdomyosarcoma	2
Reticulum cell sarcoma	1
Lymphosarcoma	1
Malignant lymphoma	1

TABLE 15
Squamous Cell Carcinoma of the Palate (11 pts.)

Stage	Area	Total # Pts.	Treatment	Alive		Died	
				2 yrs.	5 yrs.	Tumor	Other
T ₁ N ₀	SP	1	Rad.	1	0	0	0
T ₁ N ₁	SP	1	Surg.	—	—	—	—
			Rad.	1	0	0	0
T ₂ N ₀	SP	1	Surg.	—	—	—	—
			Rad.	1	0	0	0
T ₂ N ₀	HP	2	Surg.	—	—	—	—
			Rad.	1	0	1	0
T ₂ N ₁	SP	1	Surg.	—	—	—	—
			Rad.	1	0	0	0
T ₃ N ₀	H & SP	1	Surg.	—	—	—	—
			Rad.	1	0	1	0
T ₃ N ₁	H & SP	2	Surg.	—	—	—	—
			Rad.	1	0	1	0
T ₃ N ₂	SP	2	Surg.	—	—	—	—
			Rad.	2	0	2	0

SP—soft palate. HP—hard palate.

TABLE 16
Squamous Cell Carcinoma of Paranasal Sinuses (40 pts.)

Sinus	Total # Pts.	Treatment	Neck Nodes (palpable)	Alive		Tumor	Died Met.	Other
				2 yrs.	5 yrs.			
Confined to maxillary sinus	7	Rad.	4	0	3	1	2	1
		Surg.	1	0	1	0	0	0
		Comb.	2	0	1	1	0	1
Extending out of maxilla	19	Rad.	16 (+) 5	2	1	4	0	0
		Surg.	(-) 11	4	1	7	0	2
		Comb.	2	0	1	1	0	0
Maxillo-ethmoid	9	Rad.	6 (+) 2	1	0	1	0	1
		Surg.	(-) 4	1	0	2	0	1
		Comb.	2	0	1	0	0	1
Ethmoid	4	Rad.	3	1	0	3	0	0
		Surg.	0	—	—	—	—	—
		Comb.	1	0	1	0	0	0
Frontal	1	Rad.	1	0	1	0	0	0
		Surg.	1	0	1	0	0	0

Tumors occurring at the junction of the hard and soft palate were also treated by irradiation. A tumor confined to the hard palate was treated unsatisfactorily by surgery.

Carcinoma of the Paranasal Sinuses

The maxillary sinus is the most common sinus to be involved with squamous cell carcinoma (Table 16). The ethmoid sinuses are the second most common group, and carcinoma in the frontal and sphenoid sinuses is rare. Nine patients had carcinoma of the maxillary-ethmoid area, and one patient had a primary squamous cell carcinoma in the frontal sinus. The patient with frontal sinus carcinoma was treated by surgical excision of the tumor. This involved removal of the anterior and posterior walls of the sinus and the dura in proximity to the tumor.

Treatment for carcinomas of the paranasal sinuses has generally been irradiation therapy in full course followed by surgery in six weeks if there was persistent tumor present, as evidenced by repeat biopsy. A tumor was felt to be resectable if it did not extend into the parapharyngeal space as demonstrated by erosion of the posterior wall of the maxillary sinus and/or the pterygoid plates or into the posterior ethmoid cells. The advent of the polytome has been an invaluable aid in determining bony erosion. Anterior ethmoid tumors can be treated by a combined approach with neurosurgery. In our experience, this combined approach has been utilized for sarcoma (chondrosarcoma and fibrosarcoma) and squamous cell carcinoma.

The majority of patients with carcinoma of the maxilla already had a tumor extending out of the maxilla either onto the cheek, the alveolar ridge, or into the nose or onto the palate. It should be noted that palpable cervical metastases were present in five of 19 such patients, but no patient in whom the tumor was confined to the sinus had palpable cervical nodes. Ohngren's line, which divides the maxillary sinus into anterior-inferior and posterior-superior regions, has been cited as an important line of differentiation in regard to prognosis. This is probably only valid in tumors completely confined to the "maxillary box." Any extension beyond the "box" wherever its origin, denotes a poorer prognosis. The surgical procedure of choice has been radical maxillectomy. This procedure has not been as cosmetically deforming as might be anticipated when

the orbit is preserved. When there is involvement with tumor close to the orbital floor, the risk of preserving the orbital contents is too great. Maxillectomy (with or without orbital exenteration) can be performed on patients who have had heavy irradiation as the wound is "open."

Unknown Primary (The Metastatic Neck Node)

Before a patient is placed in this category, a complete evaluation including multiple biopsies of the laryngopharynx and nasopharynx has been performed. In addition, bronchoscopy, esophagoscopy, esophagram, and planograms of a suspected lesion in the lung, as well as thyroid function studies are done. Upper and lower G.I. series and I.V.P. are performed if there is any suspicion that this might be a primary site. If there is no evidence of another primary lesion, biopsy is performed with patient prepared for radical neck dissection. The "last" diagnostic procedure is biopsy.

Jesse and Neff¹² reported 10 three year survivors among twenty-two patients with squamous cell carcinoma in subdiaphragmatic nodes in patients who had an occult primary. A report on unknown primaries from the head and neck services at Memorial Hospital in New York¹³ reveals a determinate survival rate of thirty-one percent in five years when the primary was never discovered. They advised radical surgical procedure for epidermoid carcinoma and melanoma.

Table 17 shows the methods of treatment involved in these patients. Patients with immediately supraclavicular nodes have a high incidence of primaries below the clavicle and are not included in this study. Three patients had radiation therapy only, and one died in one year. The other two were alive at eight and ten years. One of

Pt.	Age	Treatment	Outcome
E.S.	38	Co ⁶⁰ & L. neck dissection	alive 10 yrs.
M.G.	60	400 KV & 8 radon seeds	alive 10 yrs.
P.G.	72	L. neck dissection	alive 7 yrs.
H.T.	68	3/68 CA in neck mass, Co ⁶⁰ 5,000r; 10/11/68 CA base of tongue, radon seeds	died of tumor, Fall '69
F.E.	50	Co ⁶⁰ 5,500 r/T 1963; 1967 osteonecrosis of mandible	alive 8 yrs.
R.L.	75	R. neck dissection; post-op. radiation	alive 2½ yrs.
S.O.	69	Co ⁶⁰ 6,000 r/T, Waldeyer's ring, suprahyoid dissection	alive 4 yrs.

these had mandibular necrosis, and one required surgery. The other patients were managed by combinations of radiation and node dissection, and in only one case was a primary tumor later found. This patient had a primary tumor at the base of the tongue. The survival rates were particularly good in this limited number of patients.

Discussion

Patients with squamous cell carcinoma involving the larynx, pharynx, nasopharynx, base of the tongue, tonsillar area, nose and paranasal sinuses have been reviewed. Follow-up data and survival statistics are listed individually in tables, accounting for each patient.

Squamous cell carcinomas of the head and neck are best treated by utilizing the skills of both the otolaryngologist and the radiotherapist. Careful follow-up of patients with early laryngeal tumors treated with radiation therapy is important. A large surgical procedure is required in patients with recurrence after radiation therapy. In patients who have recurrence in the tonsillar area or hypopharynx after radiation therapy, surgery may provide palliation but does not provide satisfactory five-year survivals. "Running after" tumors is not valid. If the lesion is originally resectable, surgery should follow radiation.

The use of 4,000r of Cobalt therapy preoperatively over a three-week period followed in three weeks by surgery did not significantly increase serious complications. The most common complication after laryngeal surgery is a fistula. A secondary closure of the fistula is usually not necessary if the patient will tolerate prolonged use of a nasogastric tube along with careful cleansing of the wound. Operative mortality is extremely low. Three patients died from causes directly related to the surgery, two from myocardial infarction and one from a cerebral vascular accident.

Based on the results of this study and the results reported by others, our present treatment plan is outlined. In carcinoma of the maxilla and tonsil, elective surgery after preoperative irradiation is being substituted for irradiation followed by surgery only for recurrence.

Larynx

1. T₁—irradiation therapy
2. T₂—limited mobility but not fixed, full course irradiation—fixed or involving cartilaginous ant. commissure, irradiation and surgery.
3. T₃ and T₄—Irradiation and surgery
4. Subglottic extension—preoperative irradiation and surgery

5. Laryngeal obstruction—immediate surgery without tracheostomy followed by postoperative irradiation.

Post-cricoid

1. Preoperative irradiation
2. Surgery

Pharynx

1. Posterior pharyngeal wall—irradiation to primary and neck
2. Lateral pharyngeal wall and pyriform sinus
 - a. Preoperative irradiation to primary and neck
 - b. Appropriate resection of primary and elective neck dissection

Base of Tongue

1. Irradiation therapy, full course
2. Irradiation therapy to negative neck—5,000r
3. Irradiation therapy to positive neck—6,000r

Tonsillar Area

1. T₁N₀—irradiation, full course (6,500r-7,000r)
2. T₂N₀—irradiation, full course or preoperative irradiation and surgery (neck and primary continuity)—individual selection
3. T₂N₁, T₃, and T₄—preoperative irradiation to primary and neck (5,000r) and surgery (neck and primary discontinuity)
4. Original primary and/or neck unresectable—irradiation, full course, (Unresectability determined by extent of primary or fixed or contralateral nodes)

Soft Palate

1. Irradiation therapy, full course
2. Irradiation to neck
 - a. No palpable nodes—5,000r
 - b. Palpable nodes—6,000r

Nasopharynx

1. Irradiation therapy, full course
2. Irradiation to clinically negative neck—5,000r
3. Irradiation to positive neck—6,000r

Maxillo-ethmoid Sinuses

1. Dental extraction (when necessary)
2. Drainage procedure—Nasoantral window
3. Irradiation—6,500r-7,000r (over eight weeks)
4. Maxilloethmoidectomy if initially resectable (may require combined intra-cranial approach.)

Criteria of resectability:

- a. Posterior ethmoids free of tumor
- b. No bony erosion of posterior wall of maxillary sinus or pterygoid plates

At present we have not developed protocols for certain areas, such as the nose, either because of the variation in extent and position of the primary or because a clear method of treatment does not present itself from available data.

Conclusion

Carcinoma of the upper respiratory and deglutition areas comprise a significant proportion of malignancies. Eighty percent of the primary lesions are visible directly or indirectly by mirror examination. Therefore, detection and biopsy

should be promptly made when the patient first presents himself to the medical profession. Open biopsy of neck metastases is condemned. It should be the last, not the first, diagnostic procedure.

Our study definitely shows that regardless of the type of particular treatment, the greatest improvement that can be made in the future will be an early diagnosis.

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It's the Law

Fatal Hemorrhage Following Surgery

A 30-year-old housewife was admitted to the hospital for cesarean section and hysterectomy. Twelve hours after the procedures were performed, she went into convulsions, shock and died. Her death was determined to be caused by internal hemorrhage.

The woman's husband filed suit. He claimed that the hospital nurses failed to monitor the woman's vital signs and that the woman's blood type was not kept available in the hospital blood bank.

The family further contended that the physicians negligently performed the cesarean section and hysterectomy and that the physicians failed to render proper postoperative care. The physicians argued that they exercised appropriate standards of care and that the woman was in irreversible shock when they were notified of her condition.

The hospital argued that the woman was not in irreversible shock and that the woman could have been saved by the physicians with proper care.

The jury awarded the family of this lady \$225,000. The verdict was against the hospital only, not against the attending physicians.

Theodore A. Peterson, M.D.
Minneapolis, Minnesota

Buck v. Cedars of Lebanon Hospital (Cal. Super. Ct., Los Angeles Co., Docket No. 949623, April 18, 1972).
The Citation 26:8, February 1, 1973.

Gilles de la Tourette's Syndrome

International Registry

FARUK E. ABUZZAHAB, SR., M.D., Ph.D.* and FLOYD O. ANDERSON, B.A.†

THE SYNDROME OF GILLES DE LA TOURETTE, with its peculiar motor and vocal symptomatology, has fascinated medical professionals all over the world. Its etiology is obscure even after over a hundred years of observations, and only recently have its symptoms been controllable. In order to obtain case reports of the illness, an exhaustive search of the literature was conducted, and an international registry was set up. This report is based upon information consolidated from 430 published cases plus 55 case reports that have come to our attention through the international registry.

History

The first description of the syndrome, albeit sketchy, was in 1810 by Bouteille¹ in his "Treatise on Chorea." Itard² presented the case report in 1825 of the Marquise de Dampierre, then 26 years old. This influential woman had developed the symptoms of Tourette's syndrome at the age of seven and, because of coprolalia and echolalia, spent most of her long life in seclusion.

Her case was to be the classic case of Tourette's syndrome. It was reported by Roth in 1850 and again by Sandras in 1851, by Trousseau in 1873, who called it "diaphragmatic chorea," and by H. Jones in 1874. She was seen by Gilles de la Tourette, Charcot, and Mirto at the Salpêtrière in the early 1880's, and her case was mentioned in Gilles de la Tourette's 1885 analysis of nine cases entitled "A Nervous Affection Characterized by Motor Incoordination, Accompanied by Echolalia and Coprolalia."³

All of the early work was not done by the

French. In 1881 (four years before Tourette's description), Friedreich published a case report of what he called "Koordinierte Erinnerungskämpfe," which was identical with the syndrome of Gilles de la Tourette.⁴

Gilles de la Tourette, prior to 1885, had taken interest in Beard's work of 1880 on the "jumpers" of Maine, O'Brien's report on "latah" in Malaya, and Hammond's treatise on "myriachit" in Siberia. This led to his 1884 paper⁵ which collected previous observations and reported one of his own. He felt that these various illnesses were in fact the same. He reasserted this opinion in his classic paper of 1885, which proved his ability as a gifted observer and nosologist, for which the syndrome was named after him.

Some of the most significant work since 1885 includes: 1890: Jacques Catrou, another student of Charcot at the Salpêtrière, presented a detailed history and 45 case summaries in his inaugural dissertation.⁶

1899: Koester found 50 cases in a review of the literature, and presented the two cases of Tourette's syndrome diagnosed in 2500 admissions at the Universitäts Poliklinik in Leipzig.⁷

1946: Mahler reported a series of ten patients studied from one to eleven years.⁸

1948: Eduard Ascher found four cases among 9000 inpatient and 50,000 outpatient admissions to a psychiatric clinic.⁹

1961: Seignot successfully treated Gilles de la Tourette's syndrome with haloperidol.¹⁰

1961: Salmi found one case of the syndrome among 5300 children at the Education Guidance Clinic in Finland.¹¹

1966: Feild, et al., reported on seven cases diagnosed out of 1.5 million admissions to the Mayo Clinic since 1935.¹²

1967: Challas and co-workers analyzed 57 case reports in a review of the literature since 1942.¹³

1970: Snyder compared various therapies in 108 cases of Gilles de la Tourette's syndrome.¹⁴

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See editorial page 514.

Summary of Case Reports

Tourette's syndrome has been known variously as *maladie de tics*,¹⁵ *tic convulsif*,¹⁶ *tic impulsif*,¹⁷ *minimische Krampfneurose*,¹⁸ and other names. The following data reflect the symptoms and historical picture evident at clinical presentation.

Figure 1 graphs the ages at which the symptoms of Tourette's syndrome first appeared. Not included in it are 15 cases (less than 4% of all cases reported) where symptom onset occurred beyond the age of 20. The age of onset in fully 90% of reported cases was between three and 16 years, with over three-fourths between the ages of five and 12 years.

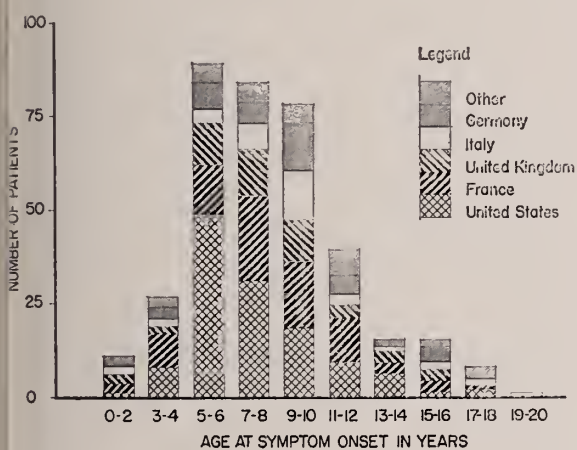


Figure 1

Seventy-one percent of Tourette tiqueurs are males, although the classic patient was a woman, first described by Itard in 1825 and by four other authors, including Gilles de la Tourette himself, in the next 65 years. The frequencies of symptoms are presented in Table 1. Motor symptoms include mainly tic-like movements, often coordinated and fluctuating. Most commonly the facial mimic muscles are involved. Grimacing, blinking and other facial tics are reported in 92% of the patients. Arm tics occurred in 78%, while only 54% had gait disturbance or frank leg tics. Head jerks and other neck tics appeared in 53% and, although several authors thought that eye-blinking was the most frequent motor symptom, it was mentioned in only 31% of the case reports. Involuntary imitation of movements, called echopraxia or echokinesis, was present in only 9% of these cases.

Vocal symptoms reported include various inarticulations, such as barks and monosyllables; coprolalia, or involuntary obscene exclamations;

TABLE 1
Frequency of Symptoms

Motor Symptoms:	
Facial tics	92%
Arm tics	78%
Leg tics	54%
Neck tics	53%
Eye tics	31%
Vocal Symptoms:	
Inarticulations	65%
Coprolalia	58%
Echolalia	23%

and echolalia, or involuntary repetition of the spoken or written word. Inarticulations were generally the first vocalizations to appear, and they were reported in two-thirds of the patients. Coprolalia, which in the presence of tics is pathognomonic of Tourette's syndrome, occurred in 58%, while echolalia was reported in only one-fourth. One or more vocal symptoms occurred in over 90% of the patients.

Psychopathology was present in 33% of the cases. The vast majority of these were various neuroses classified as obsessive-compulsive. Frequently encountered were arithmomania, (repetitive counting) folie du doute and delire du touche (abnormal doubts, abnormal desire to touch).

Electroencephalographic studies were done on 102 patients, with 45 producing abnormal results. Figure 2 depicts the distribution of scores on the Wechsler Intelligence Scale for Children. Forty-five full scale scores were reported, with almost normal distribution except for a preponderance of scores in the 110-119 range. In 66 case reports, intelligence was described as "average," with 26 "above average" and 14 "below average."

A family history of neuroticism was found in 57%, but this figure is misleading, since positive findings were of common and unrelated problems,

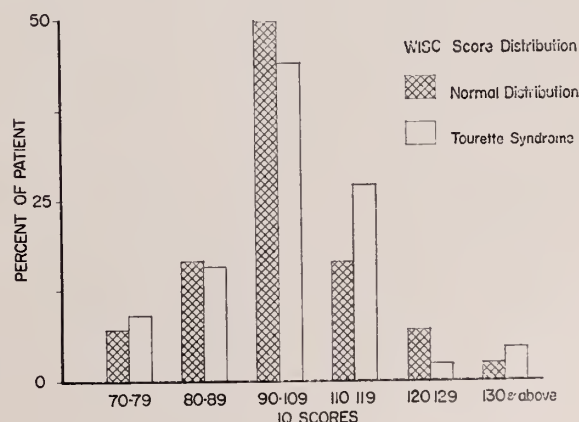


Figure 2

and rarely was there any extrapyramidal tract involvement. Only in three cases was another family member a Tourette tiqueur.

Among the many possible causes that have been suggested for Tourette's syndrome are birth damage, early traumatic events or infectious diseases, and family dynamics. Birth abnormalities and abnormal growth and development were reported in only 15% of patients, and none of these were frequent enough to make one suspect any connection with the development of the illness. On the other hand, a precipitating event was described in 161 cases or 37%. Most frequently associated with symptom onset were infections and various traumatic episodes, with no significant incidence of encephalitis or probable encephalitis (3%).

There is evidence that family dynamics may contribute if one or both parents are strict or dominating, or if the domestic situation is in other ways hostile. This was the case with 135 patients. Such data were seldom reported by early investigators.

Cross Cultural Analysis

When the 485 cases were divided into groups reflecting their national origin, as is seen in Table 2, there were five groups (from the United States, France, the United Kingdom, Italy and Germany) with a sufficient number of patients so that significant statistical comparisons could be made. Each group was analyzed against all cases not in that group by the Chi Square method (Graph in Figure 1).

As is evident from Figure 1, the cases from the United States have an earlier age of onset than the European ones, and this difference is statistically significant.

There were few significant deviations in motor symptoms between groups and the male-female ratio also showed an excellent fit. The high correlations between samples in all but a few instances

TABLE 2
Cross-Cultural Distribution

No. Cases	Country
174	United States
107	France
57	Germany
53	United Kingdom
46	Italy
48	Other:
	Eastern Europe, 25
	Scandinavia, 9
	India, 5
	Japan, 2

were impressive. The Italian sample showed a significantly higher frequency of eye tics, while the French showed significantly fewer. More neck tics were observed in the United States sample and fewer in the French.

A similarly close fit was not found with the copro- and echophenomena, however. The British group displayed significantly less echophenomena, while the other vocal phenomena fit closely. On the other hand, the French group showed much more echokinesis than expected. Many of the patients in earlier reports from France presented this symptom, which was described in the French literature of the early 1880's. Perhaps the novelty of this fascinating symptom led to its frequent diagnosis.

Coprolalia was found to occur in the United States with a significantly higher frequency than elsewhere, although other vocal symptoms occurred with expected frequencies. Despite the many statistically significant differences found in other groups, the German sample corresponded very well and could be described as the typical group.

TABLE 3
Cross-Cultural
Symptom Differences*

United States	Younger age at onset More neck tics More coprolalia
France:	Less neck tics Less eye tics More echokinesis
Germany:	No significant differences
United Kingdom:	Less echophenomena
Italy:	More eye tics

*Using the CHI-squared method with $P < 0.05$.

Results of Therapy

Table 4 gives the results of the most frequently used modes of treatment. In the 430 cases in the literature, there were just under 600 therapeutic trials, many patients being given more than one type of treatment.

Different types of psychotherapy were frequently employed with Gilles de la Tourette's patients. Forty-five percent were described as "improved," but only 12% for more than six months. Behavioral modification therapy produced six-month "improvement" in 25% of trials, but had a 75% failure rate.

The results of chemotherapy are difficult to evaluate due to the simultaneous administration of different classes of drugs. The benefit of halo-

peridol is plain. Fully two-thirds of its therapeutic trials gave a greater than six-month "improvement," and 89% of trials produced some "improvement." The other antipsychotic tranquilizers produced "improvement" in 48% of trials, with 22% giving long-term "improvement."

Other modes of therapy not tabulated, many of them now known to be undesirable, do not seem to be valuable in the control of Tourette symptoms. These miscellaneous therapies include chiropractic treatment, lysergic acid diethylamide (LSD), fever therapy, hygiene, flogging, strictness, megavitamins, leeches and muscle relaxants.

It is of note that 14 patients (3.3%) had spontaneous remissions at six-month follow-up.

Comment

Over two-thirds (71%) of Tourette patients in our sample were males, comparing closely to the ratios observed by Gilles de la Tourette and subsequent investigators. A similar preponderance of males is seen with simple tics. The key clinical features leading to the diagnosis of Tourette's syndrome in this study were childhood onset (90.5% between three and 16 years) of more or less generalized motor tics involving most frequently the face (98%) and the upper extremities

(78%). One or more vocal symptoms, either inarticulations, coprolalia or echolalia, were present in 93% of cases at some time during the course of the illness. In the vast majority of cases, the vocal symptoms led to the diagnosis, although coprolalia, considered pathognomonic of the syndrome, occurred in just 68% of the cases.

The syndrome's course is typified by remissions and exacerbations with fluctuating symptomatology. Spontaneous remissions of six months or more were observed in only 14 reported cases (3.3%).

There are no diagnostic tests of value currently. However, Messiha, et al.¹⁹ reports that levels of urinary catecholamines, notably dopamine, fluctuated directly with the severity of symptoms in a patient with Tourette's syndrome. Earlier, Snyder, et al.¹⁴ hypothesized that hypersecretion of dopamine in the corpus striatum could be at least part of the pathophysiological picture, given the startling improvement seen with haloperidol therapy.

The cross-cultural comparison of case histories showed that the main features of the syndrome are similar, with some variation in symptom expression as summarized in Table 3.

The statistically significant variation in symp-

TABLE 4
Comparative Efficacy of Various Treatments in Gilles de la Tourette's Syndrome

Treatment	No. of Patient Trials	Treatment Failures	Improvement of Unknown Duration	Improvement for less than 6 mos.	Improvement for more than 6 mos.	% Improved for more than 6 mos.	Total % Improved
Psychotherapy	117	65	31	7	14	12	45
Hypnotherapy	27	23	2	0	2	7	15
Hydrotherapy	25	22	1	2	0	0	12
Isolation	19	14	0	3	2	11	26
Sleep therapy	13	6	4	3	0	0	54
Behavior therapy	12	9	0	0	3	25	25
Bed rest	6	4	1	1	0	0	33
Shock therapy	25	20	3	2	0	0	20
CO ₂ Inhalation	11	9	0	1	1	9	18
Physical therapy	9	4	4	1	0	0	56
Thalamotomy	3	2	0	0	1	33	33
Lobotomy-leucotomy	2	1	0	0	1	50	50
Sedatives ¹	98	79	11	4	4	4	19
Haloperidol	63	7	8	6	42	67	89
Other Antipsychotic Tranq ²	81	42	16	5	18	22	48
Antidepressants ³	17	13	1	3	0	0	24
CNS stimulants ⁴	17	14	1	1	1	6	18
Anticonvulsants ⁵	16	13	2	0	1	6	19
Antiparkinsonians ⁶	7	5	0	1	1	14	29

Spontaneous Remission 14 (representing 3.3% of patients)

Analysis of various therapies reported in 430 case histories of Gilles de la Tourette's syndrome surveyed in the literature (often several therapeutic trials were given to the same patient). (1) "Sedatives": ethanol, chloral hydrate, ethchlorvynol, bromides, barbiturates, meprobamate, chlordiazepoxide, diazepam, oxazepam, hydroxyzine, methaqualone, arsenic, paraldehyde. (2) "Antipsychotic tranquilizers": reserpine, rauwolfia alkaloids, chlorpromazine, promazine, trifluorpromazine, thioridazine, prochlorperazine, trifluoperazine, chlorprothixene, fluphenazine, perphenazine, thiothixene, piperacetazine, promethazine. (3) "Antidepressants": imipramine, amitriptyline, nortriptyline, doxepin, protriptyline, isocarboxazid, phenelzine, iproniazid. (4) "CNS stimulants": amphetamine, d-amphetamine, methamphetamine, methylphenidate. (5) "Anticonvulsants": Diphenylhydantoin, primidone, trimethadione, ethosuximide, paramethadione. (6) "Antiparkinsonians": belladonna alkaloids, trihexyphenidyl, bethtropine mesylate, orphenadrine, diphenhydramine, L-dopa, amantadine.

tom expression could represent the bias of authors from particular cultural settings. One difficulty in our attempts at cross-cultural analysis was that only 48 cases (9.9%) were reported from countries other than the United States, France, the United Kingdom, Italy and Germany, most of the others being Eastern European. The higher incidence of case reports from the Western nations might reflect eagerness to publish rather than an actual higher incidence of the illness.

The comparison of different treatment regimes

used with these patients shows that haloperidol is superior to any other treatment, and must be considered the treatment of choice in Gilles de la Tourette's syndrome. The antipsychotic tranquilizers have some value, but the efficacy of psychotherapy and other regimes is questionable.

An international registry has been founded and physicians are encouraged to contribute their clinical observations by contacting the senior author of this article.

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Capillary-viritis Syndrome

Eppinger in 1938 first introduced the term "capillary syndrome in viral infections" in connection with protein leakage into the tissues. Injury to the capillary system and change in its physiologic function have been observed as sequelae in several types of viritis. Increased fragility with petechiae and purpura are commonly present. Permeability is increased with loss of a significant amount of plasma through the walls of these minute vessels.

Sokoloff expressed the belief that the capillary changes are of special importance in such diseases as viral hepatitis, poliomyelitis, smallpox, measles, primary atypical pneumonia, mumps with orchitis, and rabies. There is, he suggested, a more ready invasion of the virus particles after damage to the vascular walls. He also suggested that the citrus flavonoids, which contain vitamin P or capillary permeability factor, minimize the injury to the wall and may reduce the degree of invasiveness by the viral infection.*

AUTHOR'S NOTE: Conversely, the most conspicuous degree of decreased capillary permeability occurs in myxedema.

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Parkinson's Disease

Modern Treatment

EDUARDO TOLOSA, M.D.*

FOLLOWING THE OBSERVATIONS by Ehringer and Hornykiewicz¹⁸ that dopamine is deficient in the striatum of patients with Parkinson's disease, L-Dopa was introduced in the treatment of this disorder. Since the initial reports by Cotzias et al.¹³ in 1967, numerous clinical trials have confirmed its effectiveness.^{10,54,34} Approximately 60% of the treated patients have shown a marked improvement in all cardinal features of the disease—rigidity, bradykinesia and tremor. The average daily dose of L-Dopa required for an optimal anti-parkinsonian effect is usually between four and six Gm. The intervals of administration vary with each patient but are usually short (two to four hours). The optimal therapeutic effect is usually achieved within one to three months. Among patients on chronic L-Dopa therapy we have found several patterns of response to the drug⁵² (Figure 1) and not infrequently this clinical response may change in a patient from a sustained improvement initially, to a short or irregular duration of effect of each dose later on. The major side effects consist of nausea and vomiting, postural hypotension, cardiac arrhythmias, abnormal involuntary movements, and psychiatric disturbances.³³ Abnormal involuntary movements occur in more than 60% of the patients after one year of treatment¹ and are one of the factors that most commonly limit the administration of optimal therapeutic doses.³² The type of movement is variable but tends to show some stereotyped characteristics for each patient. Any muscle group may be involved but the ones affecting the orobuccofacial (Figure 2) and the truncal musculature are frequently very disabling. They may occur at the time of best anti-parkinsonian effect of the drug, but in some patients we have observed them when marked parkinsonian features are present, making it difficult to establish whether the patient

is under or overdosed. In this context we have found the determination of plasma-dopa concentrations to be very useful.⁵³

Although L-Dopa has been a major step forward in the treatment of Parkinson's disease, this form of therapy has certain shortcomings. The most significant ones are: a long induction time for optimal effects, toxic side effects and a short or irregular response in some patients. About 10 to 15 percent of the cases obtain a poor results because of intolerance to the drug or because of only minimal improvement for reasons that are unknown. In an attempt to overcome these problems, drugs that can potentiate the therapeutic

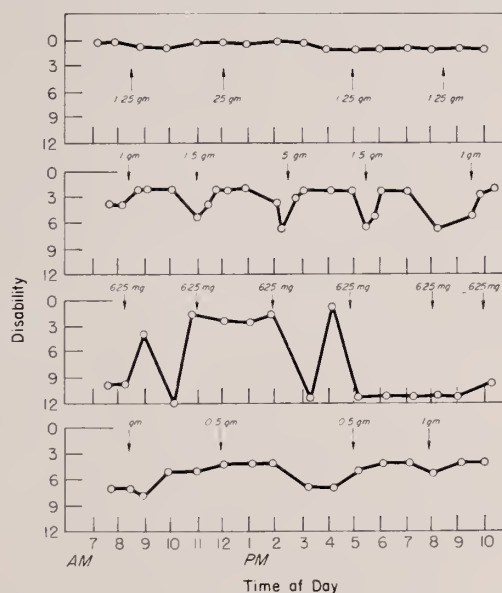


Fig. 1—Patterns of clinical response to L-Dopa among patients on chronic L-Dopa therapy. Upper curve: sustained clinical response through the day. Middle curves: short or irregular duration of effect of each L-Dopa dose. Lower curve: little improvement to repeated doses of L-Dopa. Curves of disability are based on hourly examinations of patients during 16 hour intervals. Disability scale represents the sum of scores (O=absent, 3=marked) for tremor, rigidity, bradykinesia and gait impairment.

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Fig. 2—L-Dopa induced abnormal involuntary movements. *Left:* Facial expression before L-Dopa administration. *Right:* Irregular dystonic contraction of the facial muscles when talking, two hours after a dose of 1 gm. of L-Dopa.

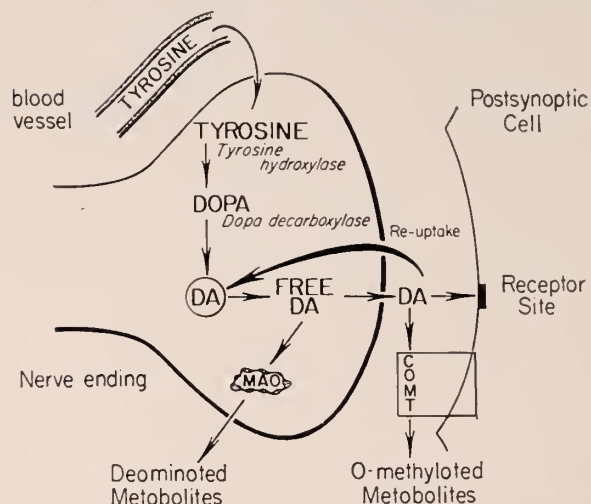


Fig. 3—Schematic diagram illustrating the main steps of dopamine (DA) metabolism in a dopaminergic synapse. Inhibition of MAO (monoamine oxidase) and COMT (catechol-O-methyl transferase) theoretically may increase the amount of DA at the receptor site. Amphetamine-like drugs stimulate the release of extra-granular, free DA. Anticholinergic agents and the tricyclic antidepressants are capable of blocking the re-uptake of DA by the nerve ending, potentiating the action of endogenously released DA.

effect of L-Dopa and reduce its undesirable side effects have been sought.

The effectiveness of L-Dopa in Parkinson's disease is thought to result from its ability to cross the "blood-brain-barrier" and increase the amount of dopamine in the striatal regions.¹² This effect can be augmented theoretically by drugs that inhibit the peripheral breakdown of L-Dopa (dopa decarboxylase inhibitors), making more amino-acid available to the brain or by drugs that presumably increase the concentration of dopamine at the receptor site by influencing monoamine metabolism at the synaptic level (Figure 3). Such drugs may either stimulate the release of extra-granular, free dopamine at the nerve endings (amphetamines), block some metabolic pathway in the central degradation of dopamine (MAO inhibitors) or inhibit the re-uptake of dopamine by the nerve terminals (tricyclic antidepressants).

Monoamine Oxidase Inhibitors

These antidepressant drugs were found to be effective in the treatment of Parkinson's disease when given with L-Dopa by Birkmayer and Hornykiewicz⁸ in 1962. Others² have noted a modest anti-parkinsonian effect of these compounds when added to anti-cholinergic drugs or even when administered alone. Their action can be related to the experimental observation that proniazid causes an apparent rise in brain catecholamines, specifically of hypothalamic noradrenaline (NA) and striatal dopamine (DA)¹⁵ but Bernheimer et al.⁶ found no increase in dopamine concentration in brains of Parkinson's patients who had received MAO inhibitors for several months. Hypertensive crises have been reported in patients on L-Dopa receiving MAO inhibitors.²⁸ In view of the fact that they produce only mild additional beneficial effects, MAO inhibitors should be avoided in patients on L-Dopa therapy.

Catechol-o-methyl Transferase Inhibitors

Dopa, DA, and other monoamine metabolites like 3,4-dihydroxyphenylacetic acid (DOPAC) and 3,4-dihydroxymandelic acid (DOMA) are o-methylated by catechol-o-methyl transferase (COMT). By blocking these pathway more dopamine can theoretically be made available at the dopaminergic receptors. If o-methylated products of dopa and dopamine are responsible for some of the L-Dopa induced side effects, these could be suppressed by administering COMT inhibitors. Ericson has reported reduction of the major parkinsonian signs as well as of some of the toxic effects of L-Dopa in 10 parkinsonian patients by administering N-butylgallate in association with L-Dopa.¹⁹

Amantadine Hydrochloride

The beneficial effects of this agent on Parkinson's disease were first reported by Schwab, et al.⁴⁴ in 1969. Its efficacy has now been confirmed in several double-blind and non-blind trials.^{25,29,37} Little is known about its mode of action. A dopamine releasing effect, similar to the one of amphetamine, has been demonstrated experimentally,²⁶ and in rats, an increased synthesis and release of dopamine in the striatum has been observed after amantadine treatment.⁴³ This drug has also been shown to block the re-uptake of NE and DA into the nerve endings in rat brains, but only when large, unphysiological doses are administered.²² Rinne et al.⁴⁰ have shown that amanta-

dine does not alter the endogenous concentration of DA, NA and HVA in the rat brain. The addition of amantadine hydrochloride (Symmetrel) to L-Dopa in the management of Parkinson's disease is of questionable value. Rinne, et al.⁴¹ found no improvement when adding amantadine to patients on L-Dopa therapy and side effects like nausea and vomiting were increased by the combined treatment, but others have indicated that the combined use of these drugs might be useful in cases when the maximum tolerated dose of L-Dopa is small.²⁵ Fehling²¹ using a double-blind cross-over technique has reported a modest improvement in a group of 24 parkinsonian patients on optimum L-Dopa dosage. Symmetrel is administered in doses of 100 mg. two to three times a day. Its toxic side effects are rare and include mental confusion, visual disturbances and livedo reticularis.

Tricyclic Antidepressants

In 1959 Sigwald et al.⁴⁶ treated ten patients with Parkinson's disease with two derivatives of iminodibenzol (imipramine and 8307 RP) and found a striking improvement in their bradykinesia, far beyond the antidepressive effect of the drugs. Since then other reports have confirmed the antiparkinsonian effect of imipramine as well as of desmethylinipramine.^{16,24,30,39,50} This effect could be related to the findings by Ross and Renyi⁴² and Snyder et al.⁴⁷ of a strong inhibitory effect of imipramine and desimipramine on the uptake of catecholamines in the rat brain, though much more pronounced in norepinephrine areas than in the dopaminergic corpus striatum. Still the mechanism of action of these compounds might be derived primarily from their anticholinergic properties.¹⁷

No firm documentation is available on the effect of adding tricyclic antidepressants to L-Dopa in the treatment of Parkinson's disease, but it is a common observation that adding imipramine or amitriptyline, 10 to 20 mg. four times a day to the L-Dopa regime may produce an improvement in some patients.

Amphetamines and Related Compounds

Thirty years ago Solomon et al.⁴⁸ reported on the therapeutic value of amphetamines in Parkinson's disease. This effect, as well as the usefulness of the combination of amphetamines plus L-Dopa in some patients recently has been confirmed by others.⁹ Amphetamine is a potent sympathomi-

metic drug and its antiparkinsonian effects are believed to be exerted by its stimulating effect on the extragranular, free catecholamines at the nerve endings. Coyle and Snyder¹⁴ have also shown experimentally that both d- and l- amphetamines are potent inhibitors of DA uptake by striatal synaptosomes of the rat brain. This effect would potentiate the action of endogenously released dopamine. Dextroamphetamine (Dexedrin) in doses of 5 mg twice a day, desoxyephedrine (Desoxyn) 2.5 mg twice daily or methylphenidate (Ritalin) 5 mg, two or three times a day can be employed.

Anticholinergic Drugs

Since the original observation, 100 years ago, by Charcot, of the beneficial effect of atropine on Parkinson's disease the anticholinergic drugs have been the treatment of choice for this disease until recently. They can produce a modest improvement, mainly of tremor and rigidity, and in many patients, they have a synergistic effect with L-Dopa.^{27,54} Their mechanism of action is disputed. A balance between dopamine and acetylcholine has been proposed as necessary for an adequate function of the striatal structures in man. In Parkinson's disease the reduction of striatal dopamine would produce an undesirable cholinergic dominance. Anticholinergic drugs would restore this balance by decreasing the amount of striatal acetylcholine.^{3,35} The anti-parkinsonian effect of these compounds, though, has not been found to be related to their anticholinergic potency.^{20,23} Recently, Coyle and Snyder¹⁴ have reported that the anticholinergic drugs are also powerful inhibitors of the uptake of DA at the endings of striatal dopaminergic neurons and this could well represent their main mechanism of action. The available anticholinergic agents have virtually similar pharmacological actions. Side effects due to peripheral cholinergic blockade such as dryness of the mouth, blurred vision, anhydrosis and urinary retention are common, and occasionally hallucinosis or a toxic confusional state may occur.

In our experience, trihexyphenidil hydrochloride (Artane), 2 mg. two to three times a day, or bztropine mesylate (Cogentin), 1 mg. three to four times a day have proved very useful adjuncts to L-Dopa therapy, but some patients respond better to other derivatives.

Dopa Decarboxylase Inhibitors

Orally administered L-Dopa is rapidly metabolized in the gut, blood and body tissues, mainly through O-methyl and decarboxylation pathways and only a small amount of L-Dopa can be detected in plasma. In an attempt to make large amounts of L-Dopa available to the central nervous system, inhibitors of dopa decarboxylase with limited capacity to cross the "blood-brain-barrier" have been administered concomitantly with L-Dopa.⁵ One of these compounds, RO 4-4602, a serylhydrazine derivative of trihydroxybenzyl has been shown experimentally to accentuate marked the L-Dopa induced accumulation of dopamine in rat brain, specifically in the striatal regions.³ Consequently smaller amounts of L-Dopa are needed when given with RO 4-4602 to increase cerebral dopamine. In man, Bianchini et al.⁷ have shown that treatment with MK-486 (alpha-methyl dopa hydrazine), a newly synthesized inhibitor of peripheral aromatic l-aminoacid decarboxylase prior to the administration of C¹⁴-L-Dopa will reduce plasma and urinary dopamine, and markedly reduce the excretion of DOPAC, an acid metabolite of dopamine. This strongly suggests that MK-486 inhibits peripheral decarboxylation of L-Dopa in man. Therefore by using a dopa decarboxylase inhibitor, some of the common side effects of L-Dopa which are presumed to be due to the adrenergic activity of its peripheral metabolites can be avoided. Considerable experience exists now in Europe^{45,51} and Canada⁴ with RO 4-4602, and MK-486 is presently the subject of several clinical trials in the U.S. and England. The few reports available on the value of the combined L-Dopa-MK-486 therapy over L-Dopa alone^{11,31,36} indicate that the salient features of the former are: (a) 60 to 70% reduction of the L-Dopa dose; (b) rapid induction of optimal therapeutic effects; (c) marked reduction of gastrointestinal and cardiovascular side effects and (d) the incidence of severity of central side effects—abnormal involuntary movements and mental disturbances—is essentially not altered.

Recently a double blind, controlled study comparing the effect of combined L-Dopa-MK-486 versus L-Dopa alone was conducted at the University of Minnesota and preliminary analysis of the results seem to corroborate the above mentioned advantages. By using a dose ratio of L-Dopa to MK-486 of 10 to one, the dose of

Dopa can be reduced by approximately 70%, though some variability exists among different patients. As can be seen in Figure 4 plasma dopa concentrations above $\mu\text{g/ml}$ can be obtained after a dose of L-Dopa as small as 125 mg. when administered with 12.5 mg of MK-486. Nausea and vomiting have been reduced to a minimum and no clinical or biochemical abnormalities related to MK-486 have been detected among our patients.

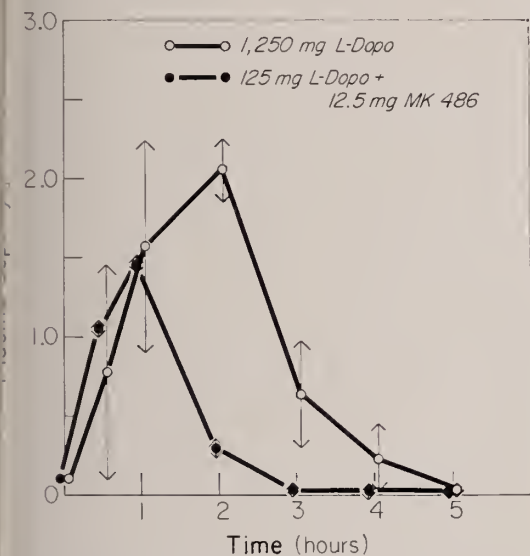


Fig. 4—Mean plasma dopa concentrations ± 1 S.D. following a 1250 mg. dose of L-Dopa (two determinations \circ) and after a dose of 125 mg of L-Dopa plus 12.5 mg of MK-486 (L-alpha-methyldopa hydrazine) (two determinations \bullet).

The decision whether to add any other anti-parkinsonian drug to the L-Dopa regime depends on the response of the patient to the amino acid. In cases in which a full and sustained improvement is obtained with the administration of L-Dopa alone it does not seem necessary to add any other therapeutic agent, with its potential unpleasant side effects. Not uncommonly, though, the therapeutic effect of L-Dopa, with or without

dopa decarboxylase inhibitors, is not complete. Here, some of the agents outlined above can be used as adjuncts to L-Dopa therapy. Of this the anticholinergic drugs are the ones that seem to have the best potentiating effect. Amantadine or one of the tricyclic antidepressants may prove better in some patients.

Since no clinical or biochemical parameters are available which indicate to which drug or combination of drugs a patient might respond better, the choice of an additional drug is made on the basis of the clinical picture, the presence or absence of certain side effects and the physician's familiarity with these different agents. The individual responses to these drugs varies and an effort on the physician's, as well as on the patient's part, should be made in an attempt to find which combination of drugs produces the maximum relief of parkinsonian signs with a minimum of side effects.

Conclusions

The finding of a reduced dopamine concentration in the striatum of patients with Parkinson's disease prompted the introduction of L-Dopa in the treatment of this disorder. L-Dopa has been confirmed in repeated clinical trials as the most potent anti-parkinsonian agent available. Amantadine hydrochloride, the anticholinergic drugs, amphetamines and the tricyclic antidepressants have proved useful adjuncts to the L-Dopa regime. The newly introduced dopa decarboxylase inhibitors are encouraging since they markedly reduce some complication of L-Dopa therapy and have so far not shown any toxicity of their own.

Modern anti-parkinsonian agents have proved strikingly successful but have also made the treatment of Parkinson's disease more difficult and have made an understanding of the basic biochemistry of the biogenic amines in the central and peripheral nervous system necessary for an adequate interpretation of their effects and their adverse reactions.

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Continuing Education Medical Dates June-July, 1973


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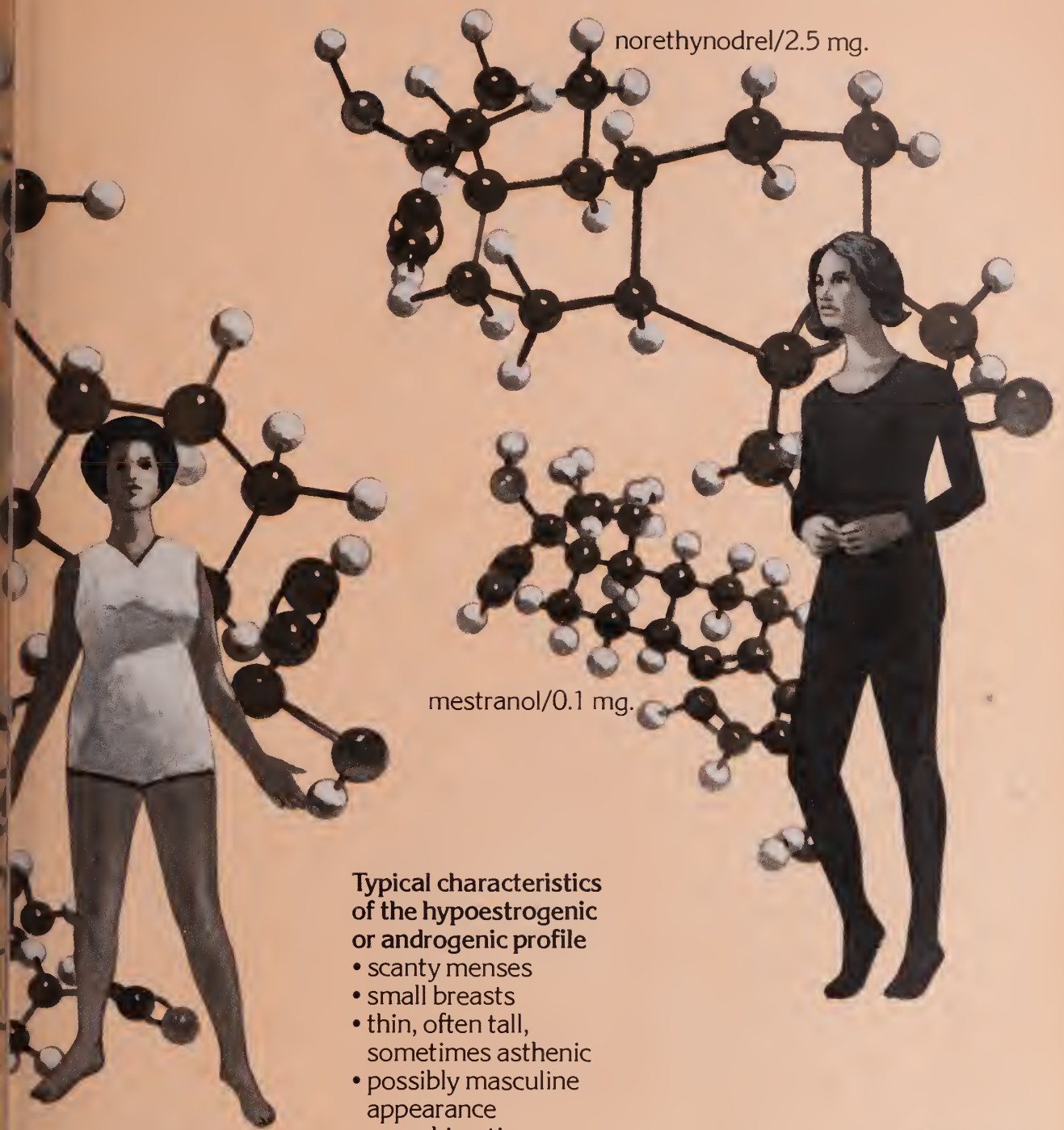
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Each pink tablet in Ovulen-28® and Demulen-28® is a placebo, containing no active ingredients.

Actions—Ovulen and Demulen act to prevent ovulation by inhibiting the output of gonadotropins from the pituitary gland. Ovulen and Demulen depress the output of both the follicle-stimulating hormone (FSH) and the luteinizing hormone (LH).

Special note—Oral contraceptives have been marketed in the United States since 1960. Reported pregnancy rates vary from product to product. The effectiveness of the sequential products appears to be somewhat lower than that of the combination products. Both types provide almost completely effective contraception.

An increased risk of thromboembolic disease associated with the use of hormonal contraceptives has now been shown in studies conducted in both Great Britain and the United States. Other risks, such as those of elevated blood pressure, liver disease and reduced tolerance to carbohydrates, have not been quantitated with precision.

Long-term administration of both natural and synthetic estrogens in subprimate animal species in multiples of the human dose increases the frequency of some animal carcinomas. These data cannot be transposed directly to man. The possible carcinogenicity due to the estrogens can be neither affirmed nor refuted at this time. Close clinical surveillance of all women taking oral contraceptives must be continued.

Indication—Ovulen and Demulen are indicated for oral contraception.

Contraindications—Patients with thrombophlebitis, thromboembolic disorders, cerebral apoplexy or a past history of these conditions, markedly impaired liver function, known or suspected carcinoma of the breast, known or suspected estrogen-dependent neoplasia and undiagnosed abnormal genital bleeding.

Warnings—The physician should be alert to the earliest manifestations of thrombotic disorders (thrombophlebitis, cerebrovascular disorders, pulmonary embolism and retinal thrombosis). Should any of these occur or be suspected the drug should be discontinued immediately.

Retrospective studies of morbidity and mortality conducted in Great Britain and studies of morbidity in the United States have shown a statistically significant association between thrombophlebitis, pulmonary embolism, and cerebral thrombosis and embolism and the use of oral contraceptives. There have been three principal studies in Britain^{1, 3} leading to this conclusion, and one⁴ in this country. The estimate of the relative risk of thromboembolism in the study by Vessey and Doll³ was about sevenfold, while Sartwell and associates⁴ in the United States found a relative risk of 4.4, meaning that the users are several times as likely to undergo thromboembolic disease without evident cause as nonusers. The American study also indicated that the risk did not persist after discontinuation of administration and that it was not enhanced by long-continued administration. The American study was not designed to evaluate a difference between products. However, the study suggested that there might be an increased risk of thromboembolic disease in users of sequential products. This risk cannot be quantitated, and further studies to confirm this finding are desirable.

Discontinue medication pending examination if there is sudden partial or complete loss of vision, or if there is a sudden onset of proptosis, diplopia or migraine. If examination reveals papilledema or retinal vascular lesions medication should be withdrawn.

Since the safety of Ovulen and Demulen in pregnancy has not been demonstrated, it is recommended that for any patient who has missed two consecutive periods pregnancy should be ruled out before continuing the contraceptive regimen. If the patient has not adhered to the prescribed schedule the possibility of pregnancy should be considered at the time of the first missed period.

A small fraction of the hormonal agents in oral contraceptives has been identified in the milk of mothers receiving these drugs. The long-range effect to the nursing infant cannot be determined at this time.

Precautions—The pretreatment and periodic physical examinations should include special reference to the breasts and pelvic organs, including a Papanicolaou smear since estrogens have been known to produce tumors, some of them malignant, in five species of subprimate animals. Endocrine and possibly liver function tests may be affected by treatment with Ovulen or Demulen. Therefore, if such tests are abnormal in a patient taking Ovulen or Demulen, it is recommended that they be repeated after the drug has been withdrawn for two months. Under the influence of progestogen-estrogen preparations pre-existing uterine fibromyomas may increase in size. Because these agents may cause some degree of fluid retention, conditions which might be influenced by this factor, such as epilepsy, migraine, asthma, cardiac or renal dysfunction, require careful observation. In breakthrough bleeding, and in all cases of irregular bleeding per vaginam, nonfunctional causes should be borne in mind. In undiagnosed bleeding per vaginam adequate diagnostic measures are indicated. Patients with a history of psychic depression should be carefully observed and the drug discontinued if the depression recurs to a serious degree. Any possible

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influence of prolonged Ovulen or Demulen therapy on pituitary, adrenal, hepatic or uterine function awaits further study. A glucose tolerance has been observed in a significant percentage of patients on oral contraceptives. The mechanism of this decrease is obscure. For this reason, diabetic patients should be carefully watched while receiving Ovulen or Demulen therapy. The age of the patient constitutes no absolute limiting factor, although treatment with Ovulen or Demulen may mask the onset of the climacteric. The pathologist should be advised of Ovulen or Demulen therapy when relevant studies are submitted. Susceptible women may experience an increase in blood pressure following administration of contraceptive steroids.

Adverse reactions observed in patients receiving oral contraceptives—A statistically significant association has been demonstrated between use of oral contraceptives and the following adverse reactions: thrombophlebitis, pulmonary embolism, cerebral thrombosis.

Although available evidence is suggestive of an association, the relationship has been neither confirmed nor refuted for the serious adverse reactions: neuro-ocular lesions, e.g., retinal thrombosis and optic neuritis.

The following adverse reactions are known to occur in patients receiving oral contraceptives: nausea, vomiting, gastrointestinal disturbances (such as abdominal cramps and bloating), breakthrough bleeding, spotting, change in menstrual flow, amenorrhea during and after treatment, edema, chloasma or melasma, breast changes (tenderness, enlargement and secretion), change in weight (increase or decrease), changes in cervical erosion and cervical secretions, suppression of lactation when given immediately post partum, cholestatic jaundice, migraine, rash (allergic), rise in blood pressure in susceptible individuals and mental depression.

Although the following adverse reactions have been reported in users of oral contraceptives, an association has been neither confirmed nor refuted: anovulation post treatment, premenstrual syndrome, changes in libido, changes in appetite, cystitis-like syndrome, headache, nervousness, dizziness, fatigue, backache, hirsutism, alopecia, scalp hair, erythema multiforme, erythema nodosum, hemiparesis, eruption and itching.

The following laboratory results may be altered by the use of oral contraceptives: hepatic function: increased sulfobromophthalein retention and other tests; coagulation tests: increase in prothrombin time, VII, VIII, IX and X; thyroid function: increase in PBI and butanol-soluble protein bound iodine, and decrease in T₃ uptake values; meloxic acid test and pregnanediol determination.

References: 1. Royal College of General Practitioners: Oral Contraception and Thrombo-Embolic Disease, J. Coll. Gen. Pract. 9: 279 (May) 1967. 2. Inman, W. H. W., and Vessey, M. P.: Investigation of Deaths from Pulmonary, Coronary, and Cerebral Thrombo-Embolic Disease in Women of Child-Bearing Age, Brit. Med. J. 2:3 (April 27) 1968. 3. Vessey, M. P., and Doll, R.: Investigation of the Relationship Between Use of Oral Contraceptives and Thromboembolic Disease. Further Report, Brit. Med. J. 2:651-657 (June 14) 1969. 4. Sartwell, P. E.; Masi, A. T.; Arthes, F. G.; Greene, G. R., and Smith, H. E.: Thromboembolism and Oral Contraceptives: An Epidemiologic Case Study, Amer. J. Epidemiol. 90:365-380 (Nov.) 1969.

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Indication—Enovid-E is indicated for oral contraception.

The Special Note, Contraindications, Warnings, Precautions and Adverse Reactions listed above for Ovulen and Demulen are applicable to Enovid-E and should be observed when prescribing Enovid-E.

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Editorials

Medical Circles

*He drew a circle that shut me out—
Heretic, rebel, a thing to flout
But Love and I had the wit to win:
We drew a circle that took him in!—Edwin Markham*

THIS ISSUE OF MINNESOTA MEDICINE is dedicated to one of the largest Medical Schools in the United States—The University of Minnesota Medical School of Minneapolis. Last fall, our enrollment increased to 227 first year students! Our alumni will recall the many men who made this school both large and excellent. The school contains some faces which are new to many of you—men who carry on their predecessors' traditions of greatness.

After 13 years as an Internist in a group practice in Brainerd, Minnesota, I returned to full time work in the Department of Family Practice Community Health at our University Medical School. The past four years have given me a chance to identify two misconceptions:

1. Some academicians seem to be convinced that practicing physicians are more concerned with business management than with quality medicine.
2. Some practicing physicians seem to believe that the academician is more concerned about research than patient care.

Neither of these thoughts is correct. The practicing physician and the academician are both con-

cerned about quality medicine and patient care; both have to work in busy clinics; both must keep abreast of the rapid advances in medicine, and both serve as teachers of patients and colleagues.

Those of us who work within the private sector of medicine and those who work within the University are all part of the same group. We have all graduated in the same basic discipline and share the common bond of a technical language.

To me, the most exciting discovery within the University has been finding a new group of colleagues . . . medical sociologists, anthropologists, and other behavioral scientists. These valuable and underpaid consultants have not always been welcomed into the medical community for they speak a different technical language. Despite our differences, they provide us with research tools which allow us to use solid scientific methodology for studying groups. Advances in biological sciences have required research with groups of living organisms and the laboratory scientists would make less progress if they had to work with single organisms. It is time for clinical medicine to extend our boundaries, work with groups of people, and advance *together* beyond the limits imposed by the study of single cases.

John B. O'Leary, M.D.*
Guest Editor

*Associate Professor, Department of Family Practice and Community Health, University of Minnesota, Minneapolis.

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The Medical School Expands

THIS ISSUE OF MINNESOTA MEDICINE, guest edited by Dean N. L. Gault and Dr. John Leary, is dedicated to the University of Minnesota (Minneapolis) Medical School and the papers are by members of its staff.

It is evident from Garrard's statistics* that Minnesota is a great supplier of physicians for the other 49 states, but we don't do too badly with 7% of Minnesota trained physicians practicing in their home state, about the national average for the home product staying home. Dean Mulhausen† describes the precipitous increase of the student body from classes of 163 in 1969 to 239 today about a 70% increase. He describes the major construction in being and contemplated to accommodate these gigantic classes. It would be

comforting to know that the funding for all this that he describes as "expected to be obtained" was actually in the bank. This expansion, incidentally, offers an immediate opportunity for practicing physicians to take part in the instruction of medical students.

Our medical school is renowned throughout the world. Its impact is felt wherever physicians practice. Its graduates, though concentrated in the states, are also found in many countries. A good share of the fundamental knowledge that constitutes medicine today is the result of research reported from the Minnesota campus. MINNESOTA MEDICINE is privileged to publish the papers collected for this issue and the Board of Editors wishes to thank the authors and the guest editors for their collaboration.

Reuben Berman, M.D.
Editor

*See page 511.
†See page 543.

The Chemotherapy of Infectious Diseases

THE PERSONAL REMINISCENCES of Wesley Spink, M.D. regarding the drama of the discovery, development and clinical usage of sulfanilamide, penicillin and other antibiotics* gives us an interesting account of these historic discoveries. Dr. Spink is justly proud of the early and important contributions which he and his medical fellows made in this field. It was our good fortune in Minnesota that several of our physicians were able to contribute much to the understanding of the clinical applications of these most useful drugs. Not the least of these were the historic trials of streptomycin in experimental and clinical tuberculosis.

For those interested in the history of the development of penicillin at Oxford University the 1970 paper by Heatley¹ gives much of the background as to how Florey, Chain and Abraham and their colleagues solved the technical problems of

producing and extracting penicillin. These problems had baffled Fleming, the microbiologist who discovered penicillin, and the skills of chemists were needed for their solution.

The most dramatic and original discoveries made by Dr. Spink and his colleagues were the consequence of their work with human brucellosis. Their demonstration in Mexico that severe, acute infections with *Brucella melitensis* would respond to modest doses of chlortetracycline has stood the test of time. Tetracyclines today remain the most effective and safe agents for human brucellosis.

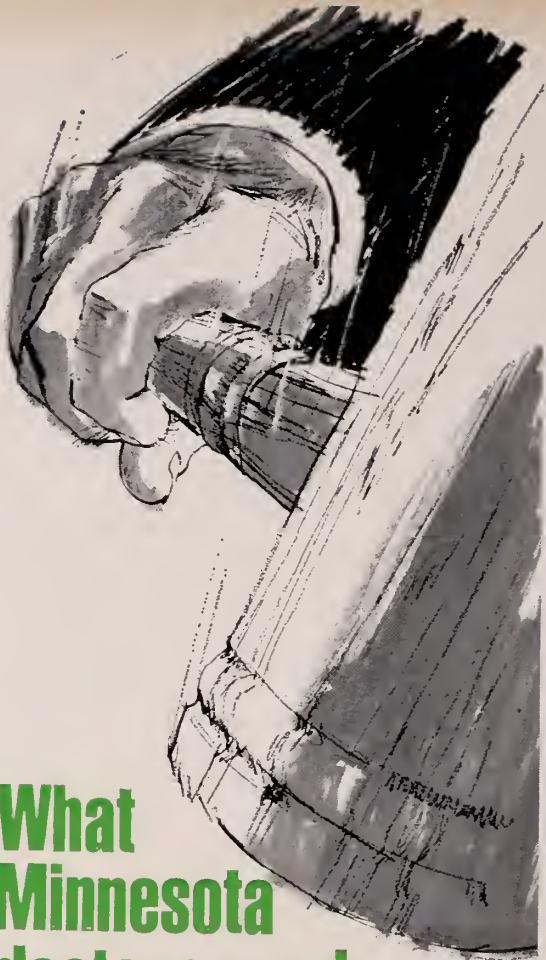
The convocation lecture by Dr. Spink, which is reprinted in this issue of MINNESOTA MEDICINE, marks the climax of his 36 years service to the University of Minnesota. We have appreciated the privilege of knowing this illustrious physician as teacher and friend.

Wendell H. Hall, M.D.
Veterans Hospital
Minneapolis, Minnesota

*See page 551.

Reference

1. Heatley NG: In memoriam, H. W. Florey: An episode. J Gen Microb 61:289, 1970.



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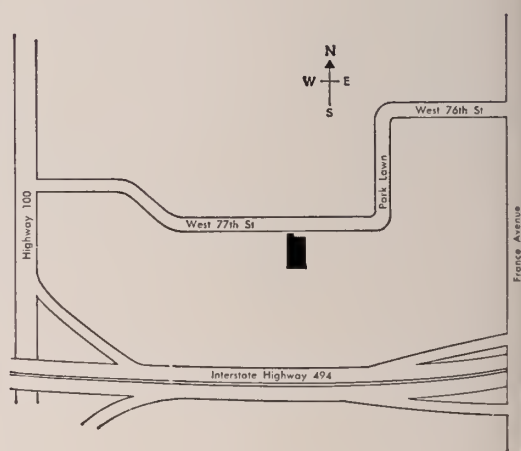
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Medical School Facilities Planning and the Health Sciences Development Program

MEDICAL SCHOOL planning for facilities received major impetus in 1966 from a recommendation of a Citizen's Advisory Commission that the University of Minnesota Medical School increase the size of the entering class in the 1970's. This recommendation was based upon the Hill Family Foundation supported study, "Health Manpower for the Upper Midwest" which documented the shortage of physicians and other health care personnel in the State and region. In response to this recommendation and the need for more physician manpower, the Medical School entering class size was increased to 227 in 1970 and to 239 in 1973 from a base of 163 in 1969.

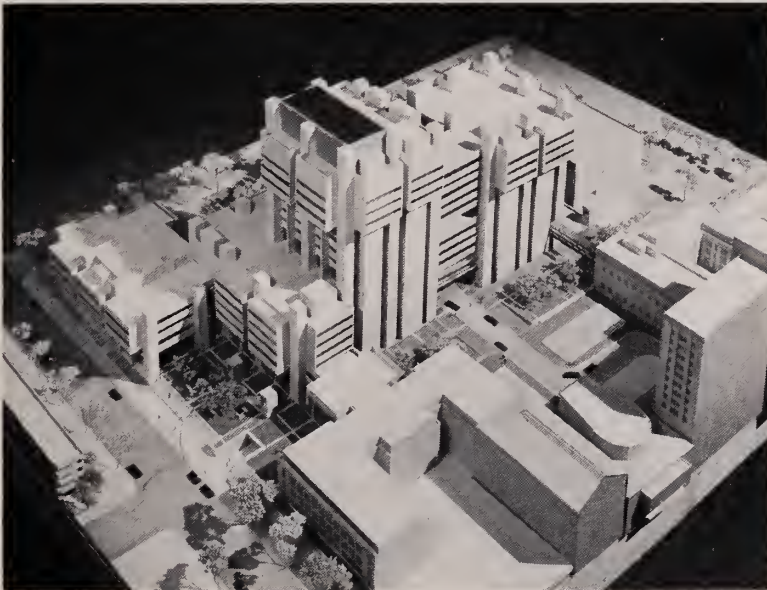
In 1970 the Medical School initiated a new curriculum which stressed interdisciplinary instruction, an accent on outpatient teaching, and the concept of lifelong, self-learning by the student. In addition, the reorganization of the University's various health related schools into the Health Sciences Center underscored the important interrelationships of Health Sciences personnel in the delivery of health care.

Based upon these needs to accommodate increased numbers of health sciences students, to

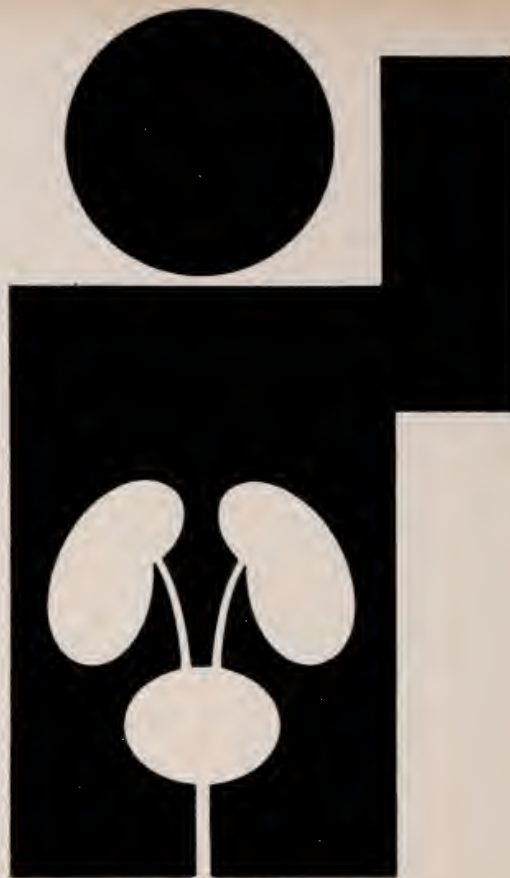
develop a new curriculum, and to foster interdisciplinary health sciences instruction, facilities planning culminated in the Health Sciences Development Program. This program consists of a combined Dental, Medical and Public Health facility to be built in two phases, a building for the School of Pharmacy, a materials receiving area, and a new parking ramp for patients and staff. Particular attention was given to planning of internal and external traffic patterns, site development in a densely populated area, parking needs and flexibility of design of the buildings.

In 1970-71 construction of the first of the new facilities, Unit A, a 19 story structure, was begun. Planned to be completely finished in January, 1974, classroom facilities devoted to basic sciences instruction of students will be ready in September, 1973, for the 1973-74 school year. To be completed at a cost of \$46 million, funds have been obtained from State and Federal sources. Unit A consists mainly of Dental School space and also includes basic sciences teaching laboratories, classrooms, auditoria, and Medical and Public Health School departmental areas.

Construction of the major Medical School fa-



Figure—Model of the Health Sciences Development Program viewed from the northwest. Unit A, the tallest structure, is in the middle of the picture. Unit B/C is to the right, or south of Unit A. Unit F is to the left, or northeast of Unit A. The current Health Sciences buildings are in the right foreground.

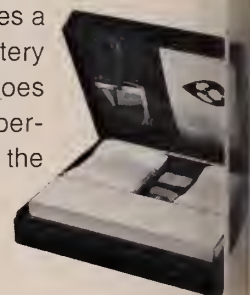


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city, Unit B/C, is scheduled to begin in 1974. Estimated cost is \$33 million. This facility will be attached to and will functionally interrelate with Unit A. Unit B/C consists of an outpatient clinic, classrooms and auditorium, a learning resources center, a small amount of Medical School departmental space and an unfinished, shell area which will be completed in the future. Funding for the unit is expected to be obtained from State Legislative sources, Federal programs, and private donations. The completed unit will greatly relieve the acute space shortage of the school and will markedly enhance the curriculum for medical students. Until the completion of Unit B/C, the Medical School will depend upon development of off campus surge space and temporary space adjustments in order to accommodate the large classes already receiving instruction at the school.

Units A and B/C are located directly across Union Street from Millard Hall and the Mayo Building and extend from Washington Avenue to the Diehl Hall Biomedical Library.

In spring, 1973, construction of a new parking ramp, accommodating 2000 automobiles, will begin. The location of this ramp at the periphery of the Health Sciences campus will allow easy access from major traffic arterials supplying the campus and will decrease automobile congestion within the campus. Special buses, traversing the short distance to the new buildings and the Mayo Complex,

will be a feature of the parking ramp.

Unit E, a supply and receiving area serving the Health Sciences buildings, has been started on River Road, next to the Variety Club Heart Hospital. Unit K, the Cardiovascular Research Unit, is being constructed atop Unit E. Supported entirely by private donations, Unit K will provide facilities for research into cardiovascular and related disorders.

Unit F, the School of Pharmacy facility, is planned for construction on Washington Avenue, just north of the newly constructed Unit A.

Planning for the needs of the Medical School and the Health Sciences remains an ongoing activity. The need to replace obsolete clinical facilities and to develop space for new educational and research programs of the Medical School continues to receive faculty, staff and student attention.

Developed physical facilities are a significant portion of the many and varied resources needed by the School to effectively pursue its programs in medical education. The understanding and support of the public and the encouragement of the practicing community of physicians continue to be vital to the provision of these resources so important to the education of physicians and the expansion of medical knowledge.

Robert O. Mulhausen, M.D.
Assistant Dean, Medical School
Associate Professor of Medicine

Squamous Cell Carcinoma of the Head and Neck

DURING THE LATE 1950's and early 1960's the concept of combined therapy for cancer of the head and neck was suggested. Preoperative irradiation therapy followed by excisional surgery was used in an attempt to increase survival in patients who had tumors not successfully treated by either surgery or irradiation alone.¹

To the patient, combined therapy means four to six weeks of external irradiation, a rest period of four to six weeks, and then definitive radical excisional surgery. The cost of this approach in terms of the patient's time, well-being, and money is significant and can be justified only by a meaningful increase in survival. To date, only Goldman and co-workers² carefully controlled prospective analysis and uncompromising protocol applied to advanced laryngopharyngeal cancers (stages II, III, and IV, American Joint Committee

for Cancer Staging) has demonstrated a significant increase in survival rates. The decision on the use of combined therapy in treating other cancers of the head and neck awaits other controlled studies to provide the needed guidelines.

Duvall, Adams, Pollack, and Charyula's report* of 584 patients promises to provide some insight into the value of combined therapy but leaves the reader disappointed. Of their 584 patients, only 69 were treated in a combined protocol and just 21 were available for determinate analysis at five years. These 21 cases represent four different tumor problems (cancer of the larynx, base of tongue, pyriform sinus, and tonsil). The 69 patients represent five distinct tumor problems (cancer of larynx, base of tongue, oropharynx, pyriform sinus, and paranasal sinuses). Not even preliminary conclusions are justified by analysis of 21 patients with four diseases or 69 patients with

*See page 480.

five diseases. Remaining unanswered are the important questions: Does preoperative irradiation actually alter survival rates and decrease local recurrences and what is the optimal dosage of irradiation?

Cancer of the base of the tongue has long been considered a unique problem in head and neck oncology. Hayes Martin considered these growths inoperable in the 1940's because of their relatively inaccessible location and because he believed that these tumors were more anaplastic and more widely metastasizing than other tumors of the upper aerodigestive system. Results of radiation therapy were disappointing. Between 1952 and 1962, 87% of the patients with cancer of the tongue base at the Memorial Hospital for Cancer and Allied Diseases³ were treated surgically. The same change in approach has occurred at the Mayo Clinic. Between 1960 and 1967, 147 patients with cancer of the tongue base were evaluated. Of these, 102 underwent operation as their primary treatment, 27 had irradiation therapy, 13 were inoperable and five could not undergo operation because of medical contraindications; four had surgical treatment after 1967 for recurrence after radiation therapy. The overall survival for those treated surgically was 42%.⁴ There is no statistical evidence to support the concept that these tumors

are biologically different from other oral and pharyngeal cancers or that they are uniquely lethal. Rather, the tongue base is a silent area and the tumors are diagnosed later than more accessible cancers. I think that surgery is the treatment of choice for cancer of the tongue base, and combined therapy may improve overall results.

Prospective protocols are necessary as investigative tools to establish validity of concepts, but they are not prescriptions for therapy. It would be ideal if the protocols proposed by Duvall et al. could be directly applied to the realities of treating patients with tumors of the head and neck. All that would be needed then would be clinical staging and a tissue diagnosis. Unfortunately, cancer occurs in individuals, and individualization of therapy requires judgment and informed consent from the patient. For example a T₁ vocal cord cancer occurring in an elderly woodsman who will be lost to regular follow-up might well be treated one way and the same growth in a middle-aged urban attorney in another without compromising the potential well-being of either.

Individualization of therapy for a given patient with a specific tumor remains fundamental to the treatment of patients with squamous cancer of the head and neck.

Lawrence W. DeSanto, M.D.
Mayo Clinic and Mayo Foundation
Rochester, Minnesota

References 1-4 will be found on page 546.

Gilles de la Tourette's Syndrome

THERE ARE few disorders that have produced a more striking visual and auditory impact on this observer than Gilles de la Tourette's syndrome. Over the past two decades I have seen three individuals with the syndrome, two preadolescent boys and a girl in her twenties in whom the onset of the disorder was in her prepubertal years.

Developmental milestones are usually reached normally. Initial signs, in most cases appearing between the ages of three to 12 years, consist of frequent inappropriate blinking, less often facial, arm, or shoulder tics or head bobbing. Within a few years, the tics progress from the face to the proximal limb muscles and "vocal tics" become prominent. These take the form initially of grunts, coughs or barks. After several years, forced echolalia (involuntary repetition of words uttered by others) become evident along with hisses, coughs, or spitting.

Electroencephalographic changes have been common in most series but the findings have been neither specific nor characteristic. Minor motor asymmetries and a greater than expected frequency of left-handedness have been noted by Sweet, et al.* who have personally studied 20 patients. The significance of these findings is not known.

The concise survey of 485 cases Abuzzahm and Anderson† nicely summarizes the findings of this disorder which has eluded pathophysiologic explanation. The good response experienced with haloperidol which blocks dopamine receptors suggests, but does not prove, that dopamine excess underlies the syndrome and that this disorder is one of altered neurotransmission.

Robert J. Gorlin, D.D.S., M.D.
University of Minnesota

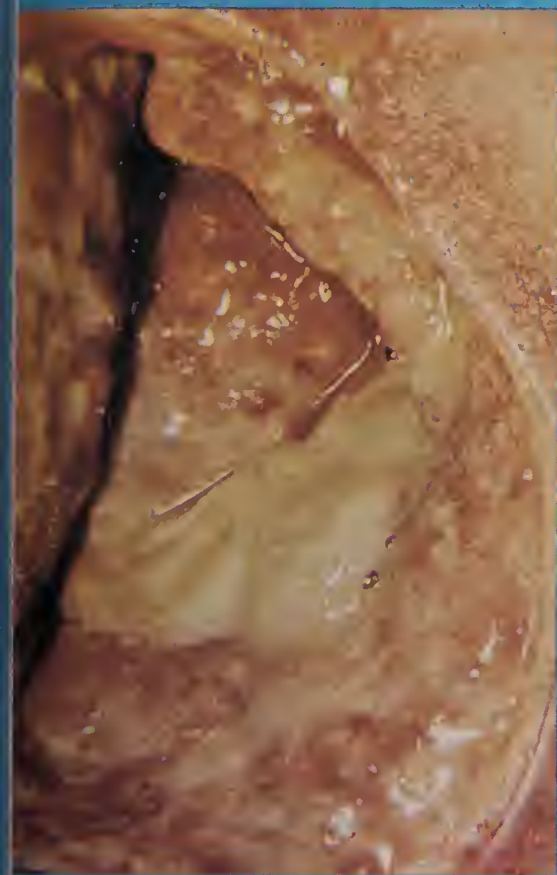
*J Neurol, Neurosurg Psychiatr 36:1, 1973.

†See page 492.

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Observation and photos by Kathleen Brough
M.D., Marion County Home, Indianapolis, Ind.

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Thoroughly soak the wound area. Where practical, tubbing or showering is suitable. Or wet soaks with gauze pads may be used. Remember to avoid chemical cleansing agents which may interfere with the therapy.



With a sterile cotton swab or finger cot, apply a very thin layer of TRAVASE Ointment. The ointment spreads easily and only a small amount is needed (a small dab of ointment will cover an area as big as the back of a hand).

Be sure, though, to rub the ointment well into every crack or crevice of the wound and overlap the surrounding skin one-fourth to one-half inch beyond the area to be debrided—to be sure of complete coverage.



Apply loose, wet dressings, thoroughly soaked in sodium chloride solution or sterile water to the area to be debrided only.



Cover the moist dressings with an occlusive wrap (Saran wrap, Telfa Pads, or other plastic wrappings) to keep wound site moist. Do not extend occlusive wrap over 1/2 inch beyond area to be debrided.



When changing dressing, gently wipe away the dissolved material. Repeat the complete dressing procedure, including application of TRAVASE Ointment, four times daily.

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- Decubitus ulcers,
- Incisional, traumatic, and pyogenic wounds,
- Ulcers secondary to peripheral vascular disease.

CONTRAINDICATIONS: Application of TRAVASE (brand of sutilains) Ointment is contraindicated in the following conditions:

- Wounds communicating with major body cavities,
- Wounds containing exposed major nerves or nervous tissue,
- Fungating neoplastic ulcers,
- Wounds in women of child-bearing potential—because of laboratory evidence of effects of TRAVASE upon the fetus.

WARNING: Do not permit TRAVASE Ointment to come into contact with the eyes. In treatment of burns or lesions about the head or neck, the ointment inadvertently come into contact with the eyes, be immediately rinsed with copious amounts of water, preclude further contact.

PRECAUTIONS: A moist environment is essential to optimal enzyme activity. Enzyme activity may also be impaired by certain antiseptics and detergents (benzalkonium chloride, hexachlorophene, iodine, and nitrofurazone) may render the ointment ineffective to the action of the enzyme (3). Compounds such as containing metallic ions interfere directly with enzyme activity, whereas neomycin, sulfamylon-streptomycin, do not affect enzyme activity. In cases where adjunctive topical antibiotics have been used and no dissolution of slough occurs after the TRAVASE Ointment for 24 to 48 hours, further application, but interference by the adjunctive agents, is unlikely to be reversed.

In cases where there is existent or threatening invasive infection appropriate systemic antibiotic therapy should be instituted.

Although there have been no reports of systemic allergic reactions in humans, studies have shown that there may be an antibody response to absorbed enzyme material.

ADVERSE REACTIONS: Adverse reactions consist of mild, transient, paresthesias, bleeding and transient dermatitis. Pain usually controlled by administration of mild analgesics. Side effects enough to warrant discontinuation of therapy occasionally have been reported.

If bleeding or dermatitis occurs as a result of the application (brand of sutilains) Ointment, therapy should be discontinued. Toxicity has been observed as a result of the topical application of TRAVASE Ointment.

Dosage and Administration

STRICT ADHERENCE TO THE FOLLOWING IS REQUIRED FOR OPTIMUM RESULTS OF TREATMENT

1. Thoroughly Cleanse and Irrigate Wound Area with sterile water or water solutions. Wound **MUST** be cleansed of any heavy-metal antibacterials which may denature enzyme substrate characteristics (e.g., Hexachlorophene, Silver Nitrate, Benzalkonium Chloride, Nitrofurazone, etc.).
2. Thoroughly moisten wound area either through tubbing or wet soaks (e.g., sodium chloride or water solution).
3. Apply TRAVASE Ointment in a thin layer assuring it covers all necrotic tissue and complete wound coverage 1/4 to 1/2 inch beyond the area to be debrided.
4. Apply loose wet dressings.
5. Repeat entire procedure 3 to 4 times per day for best results.

How Supplied

3P3002 TRAVASE Ointment is supplied sterile in one-half ounce (14.2 g.) containing 82,000 casein units of sutilain in a hydrophobic ointment base.

The ointment must be stored under refrigeration at 2° to 10° (35° to 50° F).

References

1. Garrett, T. A. *Bacillus subtilis* protease, a new agent for wound care. Clin. Med. 76: 11-15, 1969.
2. Hesterberg, R. (Necrosis treatment on fermentative basis) dissertation from the Chirurgical Clinic of the University of Bonn. Dissertation Printing: Charlotte Schoen, Munich, 1964. (German).
3. Howes, E. L. The healing of the burn may be hindered by topical antibiotics. 20th Cong. Soc. Inter. Chir., Rome, Italy, September 1967.
4. Prytz, B., Connell, J. F., Jr., and Rousselot, L. M. *Bacillus subtilis* protease in the digestion of burn eschar. Clin. Pharmacol. Ther. 347-51, 1966.

*A casein unit is the amount of enzyme required to produce optical density at 275 mμ as that of a solution of 1.5 mcg of casein after the enzyme has been incubated with 35 mg. of casein for one minute.



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DIVISION OF TRAVENOL LABORATORIES, INC.
Morton Grove, Illinois 60053

Introduction of the Department Heads of the University of Minnesota Medical School

A MEDICAL SCHOOL is an organization of persons; these persons are commonly categorized in groups: faculty, students, and technical, administrative, and clerical personnel. The excellence of the medical school depends on the collective quality and performance of these persons. The University of Minnesota Medical School has been fortunate throughout its history to have attracted men and women who have advanced and sustained the School's fame as a leading academic medical center of the United States and the world. Not only has the School been the major source of the health manpower for the State of Minnesota, but it has contributed notably to the advances in biomedical sciences and health care for all mankind.

In the Medical School's organization one group has through the years been responsible for distinguished leadership of the School's programs. This group is the Heads of Departments. These scientists assume the responsibility for guiding the activities of their departments in concert with the School's objectives; they have served to maximize the tremendous energies of the faculty and students.

It is with pride that I, as Dean, have this opportunity to present to the readers of MINNESOTA MEDICINE, the Heads of the Departments of the University of Minnesota Medical School in the year 1973:

N. L. Gault, Jr., M.D., Dean
Guest Editor



John A. Anderson
Professor and Head
Department of Pediatrics 1954-
University of Minnesota BS '30, MB '33, MD '34, PhD '40.
Previous University appointments:
Stanford University 1949-54
University of Utah 1943-49
University of Minnesota 1937-43



Wallace D. Armstrong
Professor and Head
Department of Biochemistry 1946-
University of Texas BA '26, New York University MS '28,
University of Minnesota PhD '32, MD '37.

UNIVERSITY OF MINNESOTA—MINNEAPOLIS



A. B. Baker
Professor and Head
Department of Neurology 1969-
Director of the Division 1946-69
University of Minnesota BA '28, BS '29, MB '30, MD '31,
PhD '34.



Ellis S. Benson
Professor and Head
Department of Laboratory Medicine and Pathology 1972-
Head, Department of Laboratory Medicine 1966-72
Augustana College AB '41, University of Minnesota MD '45.



Shelley N. Chou
Professor and Acting Head
Department of Neurosurgery 1970-
St. John's University, Shanghai, China BS '48, University of Utah
MD '49, University of Minnesota MS '54, PhD '64.



Edward W. Ciriacy
Professor and Head
Department of Family Practice and Community Health 1973-
Pennsylvania State College BS '48, Temple University MD '52.

DEPARTMENT HEADS

Richard V. Ebert
Professor and Head
Department of Medicine 1966-
University of Chicago BS '33, MD '37.
Previous University appointments:
University of Arkansas 1954-66,
Northwestern University 1953-54,
University of Minnesota 1946-53



Eugene Gedgaudas
Professor and Head
Department of Radiology 1969-
University of Munich, Germany, MD '48.
Previous University appointment:
University of Manitoba, Canada 1957-1963



Eugene D. Grim
Professor and Head
Department of Physiology 1968-
Kansas State College BS '45, MS '46, University of Minnesota
PhD '50.



Robert W. Goltz
Professor and Head
Department of Dermatology 1971-
University of Minnesota BS '43, MB '44, MD '45.
Previous University appointments:
University of Colorado 1965-71
University of Minnesota 1950-65



UNIVERSITY OF MINNESOTA—MINNEAPOLIS



John E. Harris
Professor and Head
Department of Ophthalmology 1958-
University of Toledo BS '35, State University of Iowa MS '38,
PhD '40, University of Oregon MD '50.
Previous University appointments:
University of Oregon 1951-58
University of Pennsylvania 1941-42
State University of Iowa 1940-41



William Hausman
Professor and Head
Department of Psychiatry 1969-
Washington University MD '47
Previous University appointments:
Johns Hopkins University 1966-69



Frederic J. Kottke
Professor and Head
Department of Physical Medicine and Rehabilitation 1952-
University of Minnesota BS '39, MS '41, PhD '44, MD '45.



Arnold Lazarow
Professor and Head
Department of Anatomy 1954-
University of Chicago, BS '37, MD '41, PhD '41
Previous University appointments:
Western Reserve University 1943-54

DEPARTMENT HEADS

Seymour H. Levitt
Professor and Head
Department of Therapeutic Radiology 1970-
University of Colorado BA '50, MD '54.

Previous University appointments:

Medical College of Virginia 1966-70

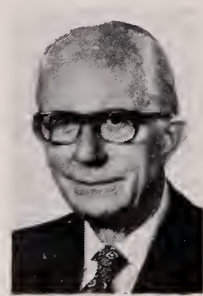
University of Oklahoma 1963-66

University of Rochester 1962-63

University of Michigan 1961-62



John H. Moe
Professor and Head
Department of Orthopedic Surgery 1969-
Director of the Division 1957-69
University of North Dakota BS '27, Northwestern University
MB '29, MD '30.



John S. Najarian
Professor and Head
Department of Surgery 1967-
University of California, Berkeley AB '48, MD '52.
Previous University appointments:
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University of Michigan BS '53, MD '57.
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Ohio State University 1964-67
Harvard Medical School 1963-64





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Previous University appointments:
Columbia University 1960-68



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Department of Pharmacology 1962-
Albion College BA '36, University of Wisconsin PhD '41,
University of Michigan MD '46.
Previous University appointments:
University of Wisconsin 1952-62
University of Michigan 1942-52
University of Wisconsin 1936-42



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Dennis W. Watson
Professor and Head
Department of Microbiology 1964-
University of Toronto BSA '34, Dalhousie University MSC '37,
University of Wisconsin PhD '41.
Previous University appointments:
University of Wisconsin 1941-49.

A Decade of Neurosurgery

SHELLEY N. CHOU, M.D., Ph.D.*

IN THE PAST DECADE significant progress has been made in the field of neurosurgery along a broad front ranging from methods of diagnosis to specific surgical therapy. This has been made possible, in part, because of progress made in allied disciplines such as neurology, neuroradiology, neuroanesthesiology and neuropharmacology. There have been valuable advances achieved in neurosurgical diagnostic techniques and procedures. One such useful procedure is brain scan. This is atraumatic to the patient and does not disturb cerebrospinal fluid circulation or cerebral hemodynamics. A positive or a negative scan can be equally meaningful in ruling in or ruling out certain types of intracranial pathology because of known uptake patterns of these lesions. Neuro-radiologic procedures such as angiography and pneumoencephalography have been refined to the point where a diagnosis of the presence and the location of the lesion can be extremely accurate. More precise localization is possible not only because of our new knowledge in anatomy of minute parts of the brain but also due to increasing capabilities to demonstrate radiologically minor variations of intracerebral structures. [One could even frequently make a reasonably good estimate as to the histology of such a lesion based upon certain features of the contrast study.] Angiographic studies can now be done with selective injection of specific vessels desired. Films can be obtained in different projections. There can be magnifications of the projections and there are additionally available subtraction techniques so as to better visualize the vascular pattern in the lesion by eliminating the skull shadow on the film by virtue of special electronic techniques. Angiographic studies of spinal cord vascular lesions such as arteriovenous malformation are also possible by cannulating selective intercostal vessels via the femoral route, although the procedure is more time consuming and the yield less fruitful.

In the area of pneumoencephalographic studies the use of a special chair and of tomographic exposure of the brain has made it possible to localize a lesion extremely accurately.

For non-tumorous pathological conditions such as hydrocephalus and cerebrospinal fluid fistulae the use of an isotope tracer study for cerebrospinal fluid circulation and/or cerebrospinal fluid leak is extremely valuable.

The control of increased intracranial pressure used to be the most difficult problem in neurosurgery. Now the use of steroids, pre, intra or postoperatively has contributed significantly to the successful control of intracranial pressure. More dramatically, hyperosmolar dehydrating agents such as Mannitol, which can be infused over a short period of time to reduce the intracranial pressure are also available. Its use, however, is usually for acute situations or to facilitate exposure at surgery.

The development and use of the microscope in neurosurgery has facilitated the surgical management of arteriovenous malformations, intracranial aneurysms, vascular tumors or other tumors in specific locations such as the cerebello-pontine angle and the parasellar region as well as peripheral nerve repair. The use of the microscope along with the development of the bipolar coagulation unit has made it possible to remove extensive spinal cord arteriovenous malformations.

Additionally, the availability of special vascular clips and the use of chemical reinforcing agents have made it possible to treat, frequently successfully, intracranial aneurysms located virtually in all conceivable locations. Still lacking are agents to combat cerebrovascular spasm associated with the rupture of cerebral aneurysms, although certain biochemical factors causing such spasm have been identified. If such spasms can be successfully controlled the mortality and morbidity rate associated with intracranial aneurysmal surgery should be negligible.

New techniques of controlling pain are being developed. Peripheral nerve or spinal cord stimu-

*Department of Neurosurgery, University of Minnesota Medical School, Minneapolis, Minnesota.

lation techniques have been developed over the past few years; though the exact neurophysiological basis for such techniques is still not known, it is possible that their effects are at the spinal cord level in controlling the gate of sensory input or at the brain stem or even at the cortical level. There is no question, however, that it does work in certain patients for pain relief. The use of dorsal column or peripheral nerve stimulation is still in its embryonic stage and in the next decade criteria in terms of selection of patients as well as development of more sophisticated instrumentation will undoubtedly make neurosurgical pain-relieving procedures very effective.

In the area of anesthesia, temporary induced hypotension can be extremely useful in certain operative procedures. The application of a clip on the aneurysmal neck, for example, would be one such situation, because hypotension renders the aneurysm less turgid and it is thus less likely ruptured with clipping. Generally hypotension does not have to be very long to achieve its purpose. The use of hypothermia can be very useful in certain neurosurgical operative procedures where temporary occlusion of one or more cerebral vessels is contemplated. Usually a moderate hypothermia of 27 to 26° C is adequate. With additional pharmacological control cardiac arrhythmia at this level of body temperature does not generally occur.

Pediatric neurosurgical management of birth

defects and hydrocephalus by various shunt procedures has made steady progress. The concept of team approach to care for these children with physiatrists, orthopedists and urologists is now well accepted.

Stereotactic neurosurgery has had its waxes and wanes partly due to periodic use of effective drugs (e.g. L-Dopa) to control certain movement disorders. However, it is still a form of effective treatment in selected patients of behavior disorders, movement abnormality, pain and seizure control.

In areas of trauma such as head injury and spinal cord injury progress made has been painfully slow. This is, in part, due to the fact that the fast moving vehicular type of injury often causes irreparable damage to the nervous system so that by comparison the progress which has been made in the neurosurgical management of trauma seems inadequate.

In looking ahead to the next decade it would seem that progress will continue to be made in the areas of pain control, peripheral nerve repair and in the availability of more sophisticated techniques at surgery to facilitate exposure and hemostasis. Research of possible applications of immunotherapeutic measures in management of tumors of the central nervous systems is on the horizon. Needless to say, there will be an extremely interesting and challenging decade ahead in neurosurgery.

Grow old along with me!

The best is yet to be,

The last of life, for which the first was made:

Our times are in His hand

Who saith "A whole I planned,

Youth shows but half; trust God: see all nor be afraid!"*

*Browning's "Rabbi Ben Ezra."

Schering

On all in-patient
services...

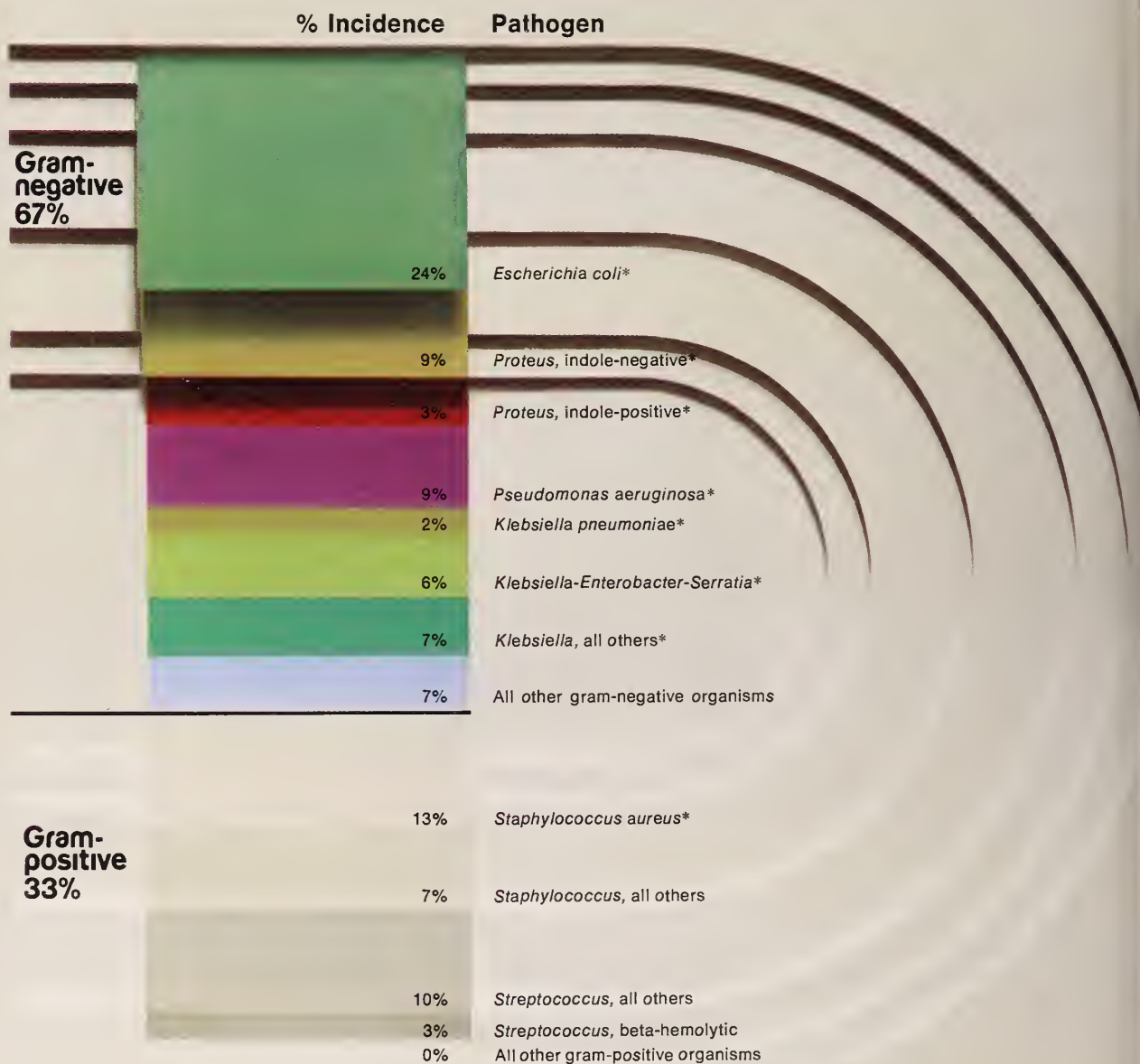
a major problem

2 out of 3
nosocomial infections
are gram-negative



Gram-negative bacteria magnified 10,000 times—color-tinted

Commonly encountered pathogens on all hospital services



Total pathogens 21,972
Source: Gosselin Audit of Pathology Cultures—1971

*GARAMYCIN Injectable is effective against susceptible strains of the pathogens indicated.

Highly appropriate spectrum for today's problem pathogens

GARAMYCIN Injectable offers a high degree of effectiveness against susceptible members of seven out of seven major gram-negative pathogens. These are:

Escherichia coli
Proteus, indole-negative
Proteus, indole-positive
Pseudomonas aeruginosa
Klebsiella
Enterobacter } species
Serratia

GARAMYCIN Injectable has also been shown effective in serious staphylococcal infections. It may be considered in those infections where penicillins or other less potentially toxic drugs are contraindicated and bacterial sensitivity testing and clinical judgment support its use.

Start with Garamycin

■ Broad gram-negative spectrum

Because of its broad gram-negative spectrum and its well-established clinical efficacy, GARAMYCIN Injectable can be considered for initial therapy in suspected as well as documented gram-negative sepsis.

Stay with Garamycin

■ Susceptibility of causative organisms confirmed

The results of susceptibility tests will, in most cases, demonstrate the causative organisms' sensitivity to GARAMYCIN Injectable. However, the decision to continue therapy with this drug should also be based on the severity of the infection and the important additional concepts contained in the Warning Box.

■ Relatively low incidence of adverse reactions

Risk of toxic reactions is low in patients with normal renal function who do not receive GARAMYCIN Injectable at higher doses or for longer periods of time than recommended.

■ Bacterial resistance has not been a problem

In the laboratory, resistance has been demonstrated to develop slowly in stepwise fashion. No one-step mutations to high resistance have been reported to date.



serious gram-negative infections (pneumonia, urinary tract infections, septicemia, and wound infections)*
 susceptible organisms

On all in-patient services...

Garamycin[®]
 gentamicin sulfate injectable
I.M./I.V.

40 mg. per cc.

Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin

WARNING

Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug. Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal impairment, treated with GARAMYCIN Injectable, usually during longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment. Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at the end of therapy who develop evidence of nitrogen retention (increasing BUN, NPN, creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments

or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, neomycin, kanamycin, cephaloridine, viomycin, polymyxin B, and polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent diuretics should be avoided, since certain diuretics by themselves may cause ototoxicity. In addition, when administered intravenously, diuretics may cause a rise in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy has not been established.

On all in-patient services...
in hospital-acquired gram-negative infections*

Garamycin[®]

gentamicin sulfate

Injectable

I.M./I.V.

40 mg. per cc.

Each cc. contains
gentamicin sulfate equivalent
to 40 mg. gentamicin

Also available:
GARAMYCIN[®] Pediatric Injectable, 10 mg. per cc.

GARAMYCIN[®] Injectable, brand of gentamicin sulfate U.S.P., injection, 40 mg./cc. Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin
For Parenteral Administration

WARNING

Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug.

Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal damage, treated with GARAMYCIN Injectable, usually for longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment.

Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at onset of therapy who develop evidence of nitrogen retention (increasing BUN, NPN, creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, neomycin, kanamycin, cephaloridine, viomycin, polymyxin B, and polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent diuretics should be avoided, since certain diuretics by themselves may cause ototoxicity. In addition, when administered intravenously, diuretics may cause a rise in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy has not been established.

INDICATIONS GARAMYCIN Injectable is indicated, with due regard for relative toxicity of antibiotics, in the treatment of serious infections caused by susceptible strains of the following microorganisms:

Pseudomonas aeruginosa, **Proteus** species (indole-positive and indole-negative), **Escherichia coli** and **Klebsiella-Enterobacter-Serratia** species.

Clinical studies have shown GARAMYCIN Injectable to be effective in septicemia and serious infections of the central nervous system (meningitis), urinary tract, respiratory tract, gastrointestinal tract, skin and soft tissue (including burns).

Bacteriologic tests to determine the causative organisms and their susceptibility to gentamicin should be performed.

Bacterial resistance to gentamicin develops slowly in stepwise fashion; there have been no one-step mutations to high resistance.

In suspected or documented gram-negative sepsis, GARAMYCIN may be considered as initial therapy. The decision to continue therapy with this drug should be based on the results of susceptibility tests, the severity of the infection, and the important additional concepts contained in the Warning Box. In the neonate with suspected sepsis or staphylococcal pneumonia, a penicillin type drug is usually indicated as concomitant antimicrobial therapy.

GARAMYCIN Injectable has been shown to be effective in serious staphylococcal infections. It may be considered in those infections when penicillins or other less potentially toxic drugs are contraindicated and bacterial susceptibility testing and clinical judgment indicate its use.

CONTRAINDICATIONS A history of hypersensitivity to gentamicin is a contraindication to its use.

WARNINGS See Warning Box.

PRECAUTIONS Neuromuscular blockade and respiratory paralysis have been reported in the cat receiving high doses (40 mg./kg.) of gentamicin. The possibility of these phenomena occurring in man should be considered if gentamicin is administered to patients receiving neuromuscular blocking agents such as succinylcholine and tubocurarine.

Treatment with gentamicin may result in overgrowth of nonsusceptible organisms. If this occurs, appropriate therapy is indicated.

ADVERSE REACTIONS

Nephrotoxicity: Adverse renal effects, as demonstrated by rising BUN, NPN, serum creatinine and oliguria, have been reported. They occur more frequently in patients with a history of renal impairment treated with larger than recommended dosage.

Neurotoxicity: Adverse effects on both vestibular and auditory branches of the eighth nerve have been reported in patients on high dosage and/or prolonged therapy. Symptoms include dizziness, vertigo, tinnitus, roaring in the ears and hearing loss. Numbness, skin tingling, muscle twitching, and convulsions have also been reported.

Note: The risk of toxic reactions is low in patients with normal renal function who do not receive GARAMYCIN Injectable at higher doses or for longer periods of time than recommended.

Other reported adverse reactions, possibly related to gentamicin, include increased serum transaminase (SGOT, SGPT), increased serum bilirubin, transient hepatomegaly, decreased serum calcium; splenomegaly, anemia, increased and decreased reticulocyte counts, granulocytopenia, thrombocytopenia, purpura; fever, rash, itching, urticaria, generalized burning, joint pain, laryngeal edema; nausea, vomiting, headache, increased salivation, lethargy and decreased appetite, weight loss, pulmonary fibrosis, hypotension and hypertension.

DOSE AND ADMINISTRATION

GARAMYCIN Injectable may be given intramuscularly or intravenously.

For Intramuscular Administration:

PATIENTS WITH NORMAL RENAL FUNCTION*

Adults: The recommended dosage for GARAMYCIN Injectable for patients with serious infections and normal renal function is 3 mg./kg./day, administered in three equal doses every 8 hours.

For patients weighing over 60 kg. (132 lb.), the usual dosage is 80 mg. (2 cc.) three times daily. For patients weighing 60 kg. (132 lb.) or less, the

usual dose is 60 mg. (1.5 cc.) three times daily.

In patients with life-threatening infections, doses up to 5 mg./kg./day may be administered three or four equal doses. This dosage should be reduced to 3 mg./kg./day as soon as clinically indicated.

*In children and infants, the newborn, and patients with impaired renal function, dosage must be adjusted in accordance with instructions set forth in the Package Insert.

For Intravenous Administration:

The intravenous administration of GARAMYCIN Injectable is recommended in those circumstances when the intramuscular route is not feasible (e.g. patients in shock, with hematologic disorders, or severe burns, or with reduced muscle mass).

For intravenous administration, in adults, a solution of GARAMYCIN Injectable may be diluted 100 or 200 cc. of sterile normal saline or in a sterile solution of dextrose 5% in water; in infants and children, the volume of diluent should be less. The concentration of gentamicin in solution, in both instances should normally not exceed 1 mg./cc. (0.1%). The solution is infused over a period of 1 to 2 hours.

The recommended dose for intravenous administration is identical to that recommended for intramuscular use.

GARAMYCIN Injectable should not be physically pre-mixed with other drugs, but should be administered separately in accordance with the recommended route of administration and dosage schedule.

HOW SUPPLIED GARAMYCIN Injectable, 40 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

Also available, GARAMYCIN Pediatric Injectable, 10 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

APRIL, 1981
AHFS Category 8:1

For more complete prescribing details, consult Package Insert or Physicians' Desk Reference. Schering literature is also available from your Schering Representative or Professional Service Department, Schering Corporation, Kenilworth, New Jersey 07033.

Projections of Future Need for Physicians in Minnesota*

H. MEAD CAVERT, M.D.†

DURING RECENT YEARS, citizens of Minnesota in the Upper Midwest, in concert with the entire United States, have insistently and increasingly posed numerous questions concerning the supply of effective physicians for meeting the health care needs of our communities now and in the near future. They are aware that, beginning with early years of planning in the mid-1960's, and bolstered through the Physician Augmentation Program in 1970 as well as increased legislative support, the Medical Schools of the state have responded vigorously with new or significantly enlarged entering classes of medical students. There are now 303 students in the first-year classes of 1972-73 at Duluth, Minneapolis, and Rochester. The important question remains for periodic review and adjusted projection of the number of physicians needed in the state and on in future years.⁸

In an extensive, well-documented study of June, 1965, sponsored by the Louis W. and Maud Hill Family Foundation, it was estimated that by 1975, Minnesota would be short from 200 to 300 physicians for the maintenance of the ratio of active physicians to population which existed in 1966.¹ On that basis, the Health Manpower Study Advisory Commission recommended that the University of Minnesota should expand its entering class to 400 students "at an early date and make plans for a further expansion to 250 at some time in the future."

To our knowledge, no similarly comprehensive study of the need for physician manpower in Minnesota has been conducted subsequently, although recently there have been major national studies and projections of future need for and supply of physicians.² These and any pertinent estimates of future needs for physicians must necessarily be developed from available, sound data bases, combined with certain assumptions involving qualitative judgment or even opinions, such as those

expressed in a future optimal or acceptable ratio of active physicians to population. The estimates and projections presented here have been derived from data selected in part on the basis of such judgments and viewpoints, albeit based on documented sources of information.

Current Status of Physician Supply in Minnesota

In its most recent annual report on distribution of physicians in the United States, the American Medical Association recorded a total number of 5863 physicians in Minnesota in 1971, or 151 per 100,000 population.³ Of that number, 5008 M.D.s were reported to be primarily involved in patient care, whether through office-based or hospital-based practice.

In Minnesota, any enumeration of active practicing physicians must take realistic account of the significant concentration of M.D.s at the University of Minnesota Health Sciences Center in Minneapolis and the Mayo Institutions in Rochester. Both centers employ large numbers of physician-faculty members engaged in teaching and research as well as patient care; both centers have large numbers of residents or medical fellows who are students and teachers as well as physicians involved in patient care; and finally, physicians at both institutions care for significant numbers of patients who are not citizens of Minnesota. For these reasons, in attempting to determine a realistic physician-population ratio for Minnesota, we estimate that the equivalent of 876 physicians should be subtracted from the reported number of active physicians in the state. Following this reduction, there remain 4132 M.D.s actively serving the population of Minnesota in 1971.

In 1971, Minnesota had a population of 3,877,000. There were 107 actively practicing M.D.s per 100,000 population in the state, after appropriate correction for the two large medical training centers. This ratio is only slightly greater than a similar index, 100 per 100,000, reported by the Northlands Regional Medical Program staff in

* Adapted from a report presented to the Education Division of the Appropriations Committee of the House, Minnesota State Legislature.
† Associate Dean.

their study of Minnesota's physician manpower in 1969.⁴ These physician-population ratios are substantially lower than the average comparable index reported for the entire United States. All of these figures, those for Minnesota as well as for the United States, attempt to report the current actual situation, and do not convey any connotation of an optimal or desirable value for the physician-population ratio.

Projection of Need for Physicians in 1985

We have attempted to estimate Minnesota's probable supply of and need for physicians in 1985. Nineteen eighty-five is a useful reference year for the future because authoritative regional population projections are available for that year, and because, by 1985, the full influence of the currently expanding medical student enrollment in Minnesota should be tangibly expressed in physician numbers and locations of practice in the state and region. By 1985 or before, most of the physicians who entered as medical students in 1975 or later will have become established in their locations of medical practice. In 1975, the University of Minnesota Medical School, Minneapolis will have approached its projected maximum plateau of total medical student enrollment. In 1976, the University of Minnesota, Duluth School of Medicine will enroll an entering class of 48 students. In the meantime, Mayo Medical School will have continued to advance its enrollment by annual addition of a first-year class of 40 students.

Based on reasonably conservative estimates of anticipated population growth, Minnesota will have a population of 4,522,000 in 1985.⁵ This figure, based upon a 19% increase in population from 1970 to 1985, has been reported recently by the Upper Midwest Council. The predicted number is quite consistent with current projections by the United States Bureau of the Census, utilizing conservative estimates of the future fertility rate in the United States, expressed as predicted family size.⁶

Using this population projection for 1985 and conservatively projecting the existing physician-population ratio to that year, we calculate that Minnesota's citizens will require the services of 4839 active physicians in 1985. Thus, to care for the future larger populations, there will be a need for 707 more medical doctors practicing in Minnesota in 1985 than in 1971.

In a study published in January, 1969, Dr. Winston Miller, Director of Northlands Regional

Medical Program, estimated an overall shortage of 993 medical doctors in Minnesota, 56% of that shortage pertaining to "personal physicians" that is, general physicians, internists and pediatricians.⁷ Dr. Miller excluded Olmsted County from his data to eliminate any distortion attributable to the location of the Mayo Clinic. If such a deficiency continues to exist in 1973, Minnesota will require an increment of 1700 practicing physicians by 1985 to meet the needs of population increase and to erase the estimated current deficit.

Projection of Physician Supply in 1985

The primary sources for future practicing physicians in Minnesota are the three medical schools in the state. Medical schools and graduate training programs from other states may serve as auxiliary sources of additional doctors for practice in this state, but over the years Minnesota has placed great reliance on and drawn heavily from graduates of its own medical institutions. We have projected the probable number of graduates from the medical schools in Minnesota to 1985 assuming a plateau at approximately 350 graduating M.D.s in 1980. We estimate that the total number of graduates produced by the three Minnesota schools will be slightly less than 4000 (4581) in the 15 years from 1971 through 1985.

To estimate the net gain in practicing physicians for Minnesota to be realized from that projected rate of M.D. production, it is necessary to make assumptions concerning several factors for which unfortunately, few or no "hard" data are available, especially in the prediction of future trends. We assume that:

1. On the average, 65 percent of M.D. graduates from Minnesota medical schools will establish practices in this state.
2. Annually, an average of 143 active physicians in Minnesota will retire, die, or otherwise become inactive; this factor assumes an average service span per active physician of slightly less than 30 years.
3. Any outflow of currently practicing M.D.s to other states will be balanced by an equal inflow of practicing physicians from elsewhere, thus maintaining on balance the 1971 base of active medical doctors in Minnesota.

On these assumptions, and after performing the indicated calculations on the projected number of M.D. graduates, 4581, we estimate that by 1985 the increased production by the medical schools will have *gained* on the current supply of active physicians in Minnesota by 833 additional M.D.s.

practicing (or nearly ready to practice) in the state.

In the meantime, the projected population increase in Minnesota will require by 1985 an additional number, 707 M.D.s, over the number active-practicing in 1971. Even acknowledging the considerable and rapid increase in the number of M.D.s graduating from the state's medical schools by 1985, that number, may be only slightly more than sufficient to offset the additional need for physicians created by the predicted population increase during the same period (833 vs. 707).

In 1969, Northlands Regional Medical Program estimated a shortage then existing in Minnesota communities of 993 practicing physicians. If we accept the assumptions and estimates presented above, significant progress toward reducing or eliminating that deficit by 1985 would have to result from alterations in factors other than currently anticipated production by Minnesota's medical schools during that period. Hopefully, we can expect a continuation of some net influx of medical school graduates from other states, especially those who may be attracted to Minnesota's graduate training centers for residency training programs. Until recently, nearly one-half of Minnesota's physicians have been graduates of non-Minnesota schools. Inflow of graduates from medical schools in other states could provide sufficient physicians (80) to reduce nearly to zero the projected deficit (-867) in Minnesota's physician manpower. The shortage of active physicians in 1985 would then be only 17 M.D.s $(-867 + 850 = -17)$.

Predictably, these estimates are sensitive to the several factors. The percentage figure selected for future retention rate of Minnesota M.D. graduates, for example, may be overly optimistic. The National Family Foundation study reported that, in recent decades, approximately 55% of medical graduates of the University of Minnesota established their practices in this state. Mindful of these data and tempering our optimism accordingly, we might reduce our assumption concerning future retention rate to a somewhat lower figure, say 60%. Other factors in the calculation remaining constant, we would then retain 2749 of medical graduates from Minnesota's medical schools in the fifteen year period, 1971-1985. On that premise, the net gain in practicing M.D.s for Minnesota would be 604, resulting in a *net deficit*, for population increase is accounted for, of 103 physicians. In that event, rather than

gaining slightly on a physician deficit reported to exist in 1969, Minnesota might fall even farther behind in its effort to overcome the state's doctor shortage. Presumably, to offset such a potential future deficit, Minnesota can continue to attract a significant inflow of additional new physicians graduated from medical schools in other states, a factor which in the past has made a substantial contribution to the medical manpower of this state.

Other Factors and Considerations

The preceding paragraphs illustrate that any attempt to extrapolate into the future the supply of and need for physicians in Minnesota necessarily involves several complications and speculations. In addition to the several factors previously discussed, there are numerous other influences, any combination of which may modify our view of physician need in 1985. Comments follow concerning some of these factors and influences.

The need for additional physicians would be accentuated by any or all of the several factors which increase the average demand by the public for medical and specifically physician services. Dr. Rashi Fein, Professor of the Economics of Medicine at Harvard Medical School and author of an authoritative monograph on the doctor shortage,⁹ has recently stated: "We can expect perhaps a 20% growth in demand for physicians' services between 1970 and 1980. This estimated increase in demand must be considered a lower limit, based on utilization at the present rate and at current prices."¹⁰ The increasing emphasis on education of the public in matters of health and disease, as well as mounting demand by many citizens for personal, individualized care may contribute to the demand predicted by Fein.

The working conditions and expectations of the present and coming generations of physicians may contribute additional influences. It seems probable that the average number of hours in the work week of physicians will decline, certainly not increase, in the next one to two decades.

The foregoing discussion has concentrated on "active" physicians in practice caring directly for patients. In the increasingly complex and extensive health care system in the United States of today and tomorrow, numerous additional M.D.s are required to perform a wide spectrum of duties requiring professional medical training and expertise, but not always involved directly in personal patient care. Examples which spring to mind include school health officers, public health officials, medical doctors serving insurance compa-

nies, and various administrative personnel. Surely Minnesota will wish to continue its outstanding record of contribution to these important functions. This factor too will increase effectively the number of physician graduates needed in Minnesota and the nation between now and 1985.

On the other side of the ledger, certain other factors or modifications in existing influences could reduce the projected need for medical doctors in Minnesota in 1985. Conceivably, various forms and combinations of existing and new allied health personnel may assume some of the time-consuming tasks now routinely performed by the physician, thus increasing his overall efficiency in patient care. But these additional auxiliary health workers will need to be trained in sufficient numbers and accepted by the patient public before their efforts can materially alter demand for physicians. Possibly improved mechanization, technology and communications will further improve the efficiency of practicing medical doctors in the future, but one can only speculate on the future impact of these modern supporting techniques.

In recent decades, the nation has relied for a significant portion of its physician manpower on foreign medical graduates who have established citizenship in this country. Minnesota's participation in this aspect of physician supply has been comparatively minor. Presumably the state does not wish to look to an increased influx of foreign medical graduates as a major contributor to Minnesota's future physician supply.

This discussion has not attempted to address the sensitive, difficult and complex issue of distribution of physician manpower and health services. Obviously modifications in distribution of doctors, either according to geographical location or professional specialty designation, or any combination of these, could strongly influence the total number of physicians needed at a future date as presented here. Distribution of either or both types undoubtedly affects perceptibly the important factor relating to retention of medical school graduates for location of their practices in the state. Various programs recently established or planned by the three medical schools should provide positive influences on distribution and retention of graduates.

Physician Manpower in the United States

Although this statement is focused primarily on the future need for and supply of medical doctors

in Minnesota, the situation in this state cannot be entirely isolated from national trends and projections of need for physician manpower. In 1971 the American Medical Association reported that there were in the United States 309,685 non-federal physicians to care for 204,280,000 people, 152 physicians per 100,000 population.³ Of this total number, 261,335 were recorded as actively involved in patient care, yielding a ratio of 261 active M.D.s per 100,000 persons. Another source estimates that there are 345,830 practicing physicians in the nation in 1973.¹¹

Debate continues among experts on the validity or inadequacy of the widespread use of the physician-population ratio as an index summarizing the status of physician manpower supply. Even less agreement exists concerning any particular value for an adequate, optimal or ideal physician-population ratio. Summarizing a discussion of this dilemma, a recent Carnegie Commission report by Blumberg commented: "None of the foregoing estimates appear to be well documented. Nevertheless, they provide rough guidelines to project needs for physicians per 100,000 population. Figures of 164 to 180 are indicated. These are for all active physicians in the United States."² These values for the ratio are considerably greater than those currently prevailing in the United States in most states, and in Minnesota.

Difference of opinion also continues among knowledgeable observers whether there is now a serious shortage in total numbers of physicians in the United States, or whether the problem is almost entirely a matter of inappropriate distribution of physician manpower. In 1970, the Carnegie Commission's report on "Higher Education and the Nation's Health" stated: "Although the debate over the extent of shortages of health manpower, critical shortages do exist."¹² More recently, a national news magazine, in an article on the physician shortage, reported data emanating from the National Institutes of Health which estimate the current shortage of practicing physicians to be 69,170 M.D.s.¹¹ The table of data proves, however, some note of encouragement that tangible progress has been made, inasmuch as the comparable shortage in 1965 was reported to be 238,131, indicating a 25% reduction in the deficit over an eight-year period.

Perhaps even more critical is the deficiency of adequate numbers of physicians for provision of high quality service in the primary care fields including general physicians, internists and pedi-

NEED FOR PHYSICIANS IN MINNESOTA

rians. Reviewing this aspect of the problem in 1972, a group of public health specialists from the University concluded: "The data available indicated the need for 133 physicians per 100,000 persons for primary care as against the available supply of about one-half as many."¹³ The authors suggest several possible approaches to at least a partial solution of this problem, such as decreasing physicians' non-patient care time and transferring some physician functions to other health care personnel.

Summary

A study in 1969 estimated a shortage of 993 physicians in Minnesota. The ratio of active physicians per 100,000 population, revised to account for the important influence of the two major health educational centers in the state, was 107 in 1971. Assuming a 19% population increase by 1985, Minnesota would require 707 additional physicians to maintain the existing physician-population ratio. Approximately 4581 new M.D.s should graduate from the three medical schools in Minnesota between 1971 and 1985. Assuming 65% overall retention of Minnesota M.D. graduates for location of practice in the state, and allowing for an average rate of retirement, death, and other inactivity of practicing physicians, we estimate a net gain of 133 additional active physicians in Minnesota, a number slightly more than sufficient to compensate for the anticipated population increase ($833 - 699 = +126$). The major portion of the current shortage would continue to exist, however, unless other compensating factors exerted a strong influence. Presumably the state can continue to expect a significant but quantitatively uncertain contribution to Minnesota's physician manpower by graduates from medical schools in other states. Until recently, nearly one-half of Minnesota's

TABLE

Estimated Need for Physicians in Minnesota, 1971-1985	
Shortage of physicians reported in 1969	993
Additional physicians needed to maintain existing ratio of 107 active physicians per 100,000 population, assuming a population increase of 645,000, 1971-1985	707
(4839-4132)	
Total additional physicians needed in 1985 (993+707)	1700

Estimated Supply of Physicians in Minnesota, 1971-1985	
Graduating M.D.s from three Minnesota medical schools, 1971-85 (projected plateau at 350 graduates annually after 1980)	4581
Graduating M.D.s establishing practice in Minnesota (assumes 65% retention; 4581×0.65)	2978
Deduction of physicians for replacement of retired, deceased or inactive M.D.s (143 annually \times 15 years)	2145

Balance of Supply vs. Need by 1985	
Net gain by 1985 of graduates practicing in Minnesota (2978-2145)	833
Remaining net gain of M.D.s after accounting for population increase (833-707)	(+)126
Remaining net deficit of physicians in 1985 (-993+126)	(-)867
Additional inflow of M.D. graduates from medical schools in other states; if 850 (or $\frac{1}{2}$ of total additional physicians needed)	uncertain Net (-) 17 near balance

physicians have been graduates of non-Minnesota schools, a percentage which now may be declining. Inflow of graduates from medical schools of other states could provide sufficient physicians (850) to reduce nearly to zero the projected deficit (-867) in Minnesota's physician manpower. The shortage of active physicians in 1985 would then be only 17 M.D.s ($-867 + 850 = -17$).

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Department of Family Practice and Community Health

University of Minnesota

EDWARD CIRIACY, M.D.*

THE STATE OF Minnesota, we currently have a deficit of some 722 family physicians based upon minimum need of 56 family physicians per 100,000 population. The net loss of family physicians in the past two years has been 37 per year by reason of death, retirement, moving, etc. As we make plans for future health care, it is essential to look at the projected population growth within the State. This is projected to go from a total in 1970 of 3.8 million to 4.5 million in 1985. Projection of annual needs to replace the current losses and to meet the needs of increased population, result in the following:[†]

1. The projected increase in population 1973-1983 is 460,000 and will require an additional 257 physicians or an average of 25 per year.
2. Retirement of the current base deficit of 722 physicians over a ten year period of time will result in a need for 70 additional physicians per year.
3. Replacement of the annual attrition of physicians will require replacement at the rate of 30 per year.

This will result in a total figure of approxi-

mately 125 family physicians needed annually for the next ten years, probably a conservative figure inasmuch as all of the health planning areas show a considerably higher than normal percentage of the family physicians being over the age of 55. This averages 38.3% throughout the State and ranges anywhere from 26.6% in Planning Area B to 41.9% in Planning Area E (Figure 1). Normally, we would expect to have only 20% of these physicians over the age of 55.

The Department of Family Practice and Community Health at the University of Minnesota has as its primary objective the training of family physicians to meet this need. The development of such a program came as a result of a feasibility study done in 1966. The program was actually initiated in 1968; became a division of the Department of Internal Medicine in 1969 and subsequently a free-standing department in 1970. The current faculty consists of nine full time physicians of whom seven are family physicians, one an internist and one a psychiatrist. A full time psychologist, educational psychologist, clinic manager and faculty member specializing in the field of communications are part of our faculty. Another five full time physician faculty serve as

*Professor and Head, Department of Family Practice and Community Health.
[†]Statistical research by John McConnell, M.D. and Michael Chemel of the Department of Family Practice and Community Health, University of Minnesota.

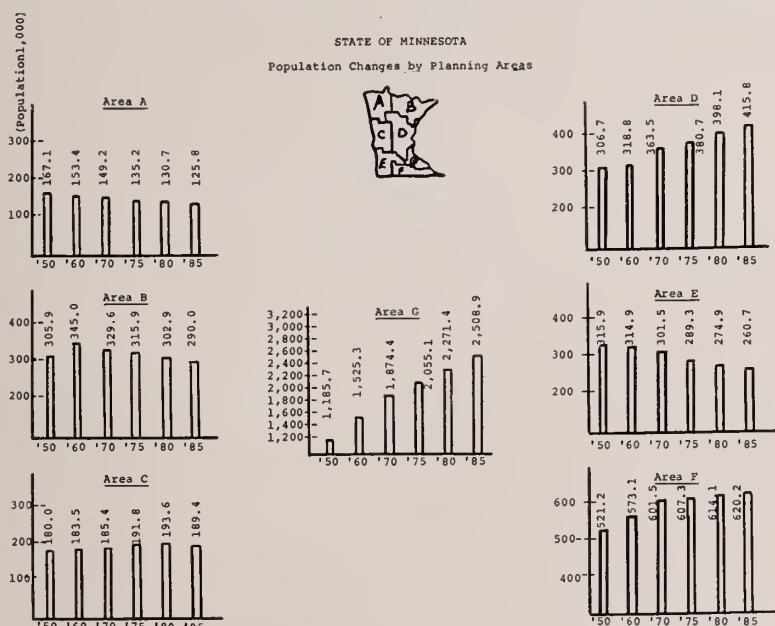


Figure 1

unit Program Directors at the various community affiliated hospitals and consists of faculty members in the fields of OB/GYN, family counseling, hospital administration, anthropology, and biostatistics.

Voluntary faculty with clinical departmental appointments number a total of 257 of whom 242 are family physicians, 12 are surgeons, two are internists, one a dermatologist, and one an osteopath. This latter group of clinical faculty support both the graduate and undergraduate education programs of the Department within the community.

Hennepin County General Hospital has five full time physicians; St. Paul Ramsey Hospital has three, all of whom are members of the departmental faculty. The two county hospital programs are academically related to the Department of

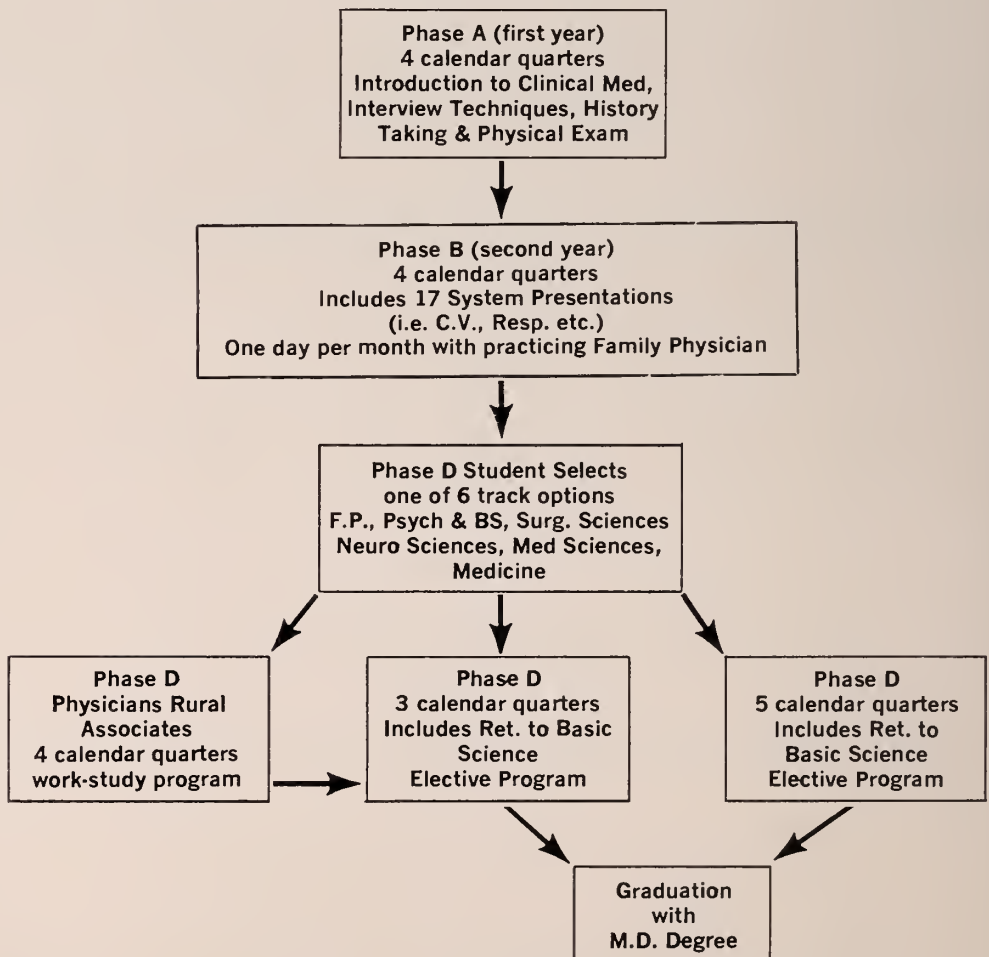
Family Practice and Community Health.

Undergraduate Activities

The Department of Family Practice and Community Health has undertaken multiple undergraduate responsibilities within the new curriculum structure. This structure is delineated in Table 1.

The class size of this institution is 239. The Department of Family Practice's current undergraduate curriculum involvement includes responsibility for 130 students in the Phase A program for one-half day per week throughout the year providing instruction in the introduction to clinical medicine, interview techniques and history taking, physical diagnosis, and the initial history and physical examination of patients. All students in Phase B spend one day per month with a practicing

TABLE 1
University of Minnesota
Medical School
Undergraduate Curriculum



cing family physician throughout nine months of their Phase B experience.

The Department of Family Practice recruits preceptors and coordinates this program.

In Phase D, the Department of Family Practice is responsible for the implementation of the Rural Physician Associate Program which currently has 38 students in rural areas throughout the state for a full year experience. Last year 23 students participated in this program. This is a combined education-service program. The physician preceptor pays the student \$5,000 and the university, through appropriated funds, pays the student \$5,000 for a total of \$10,000 for the year. The student becomes intimately involved in patient care with his preceptor during this period of time and returns to the University for an additional three calendar quarters of electives prior to receiving his M.D. degree.

The Department has also been active in the development, organization, and coordination of the preceptorship program in which students are sent out with both rural and metropolitan physicians for a period of six weeks during their Phase D program. Last year, some 64 students were out for this experience and this year it would appear that some 80 students will be participating. Eighty-three of the current Phase D students are lacking in Family Practice, and the department assumes the responsibility for advising these students in their curriculum planning.

Graduate Education Program

The Department of Family Practice and Community Health is responsible for the Affiliated Community Hospital Training Program in Family Practice. The major objective of this program is to train family physicians capable of giving continuing and comprehensive care, which includes the ability to apply this continuing care in a manner which gives appropriate recognition to the individual patient's life-style and relationship with his family and community. This comprehensive responsibility requires knowledge of and the ability to coordinate community health services.

This major objective clearly implies not only the provision of a training program designed to produce a physician of competence within the additional disease and organ oriented areas of patient care, but must provide for the acquisition of a body of knowledge within the behavioral sciences, allowing the student to function in this

comprehensive role.

Emphasis is placed upon developing expertise in common disease and health problems and in emergent care. Stress will be placed upon the diseases and problems which are most common to the ambulatory patients as well as the more common disease entities which are traditionally seen in the hospitalized patient.

We in Minnesota have been fortunate to have our training program in Family Practice funded by the State Legislature. Such financial support carries with it a very clear obligation to encourage the graduates of our training program to meet the needs of our own state and the areas immediately adjacent, for which the University of Minnesota has traditionally accepted some degree of responsibility.

The rationale for the development of the University of Minnesota Affiliated Training Program in Family Practice is based upon the recognition that community hospital participation in such a training program would provide a patient population with common diseases and problems most appropriate to this type of training program. The community hospital also provides a staff of very competent physicians within the fields of Family Practice and the traditional specialties who are involved in the ongoing care of such patients.

The University Hospital provides a patient population much more likely to have more unusual, esoteric types of disease. It provides full time teaching faculty with indepth expertise in the many specialty and subspecialty fields and a resource of many other disciplines, both academic and clinical with which to supplement the training program curriculum.

The development of such a consortium under the direction of the University of Minnesota Department of Family Practice and Community Health offers the administrative opportunity to coordinate the resources of both the community and the University in the development and implementation of a training program in Family Practice. There is the additional advantage of being able to utilize the graduate education program as the basis of a model for developing and nourishing student interest in a career within the field of Family Practice.

The program was developed utilizing six community hospitals and the University of Minnesota Hospital. The institutions participating in this program at the present time are (Figure 2):

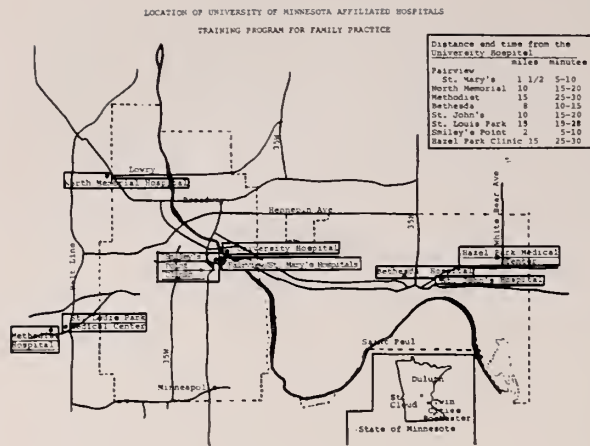


Figure 2

University Hospital	University of Minnesota Minneapolis, Minn. 55455
St. John's Hospital	403 Maria Avenue St. Paul, Minn. 55106
Bethesda Hospital	559 Capitol Blvd. St. Paul, Minn. 55101
Fairview Hospital	2312 South Sixth Street Minneapolis, Minn. 55406
St. Mary's Hospital	2414 South Seventh Street Minneapolis, Minn. 55406
Methodist Hospital	6500 Excelsior Blvd. Minneapolis, Minn. 55426
North Memorial Hospital	3220 Lowry Avenue North Minneapolis, Minn. 55422

Each of these institutions has developed or is in the process of developing a Model Family Practice Unit. The Model Family Practice Unit associated with the University of Minnesota is located within the University Hospital complex. The Model Family Practice Unit of St. John's Hospital is the Hazel Park Medical Center located at 933 White Bear Avenue, St. Paul, Minnesota, a distance of approximately five miles from St. John's Hospital. The Bethesda Hospital has established a Model Family Practice Clinic on the sixth floor of the hospital in a remodeled, abandoned, surgical suite. St. Mary's and Fairview Hospitals have joined together to produce a single unit within our program with its Model Family Practice Clinic located one block from the hospital facility and known as Smiley's Point Clinic, located at 2200 Riverside Avenue, Minneapolis, Minnesota. Methodist Hospital utilizes the Department of Family Practice within the St. Louis Park Medical Center located at 5000 West 39th Street, St. Louis Park, Minnesota, a distance of one mile from the hospital. North Memorial Hospital is the most recent addition of community

hospitals to the University of Minnesota Affiliated Training Program in Family Practice. They have not as yet developed their Model Family Practice Unit. This unit will be located near the hospital and will be completed in the Spring of 1973. Currently, only first year residents are located at North Memorial Hospital and these residents will start their half-day participation in the Model Family Practice Unit at the time of its completion. The geographic location and distances between these institutions are noted in Figure 2.

Each of these institutions function as a semi-autonomous unit having home-based residents assigned to them for the three year training program in Family Practice (three years following completion of M.D. requirements). The residents develop a continuing relationship to the patients within their own Model Family Practice Units and rotate out of their home-base hospitals and units on infrequent occasions.

During the resident's training program of three years duration (36 months) his assignments are as follows:

Internal Medicine & medical specialties	9	months
Pediatrics	4	months
Surgery & surgery specialties	6	months
OB/GYN	3	months
Model Family Practice Unit	18	months
Psychiatry	1	month
Emergency Room	1	month
Electives	1.5	month
Vacation	1.5	month
		<hr/>
		36.0 months

It is recognized that there is considerable overlap in many of these areas and the arbitrary time assignments do not necessarily accurately reflect emphasis, i.e., much internal medicine is applicable to pediatrics. In addition the Model Family Practice Unit teaching does directly relate to many of the traditional specialties. Much of the time in the last two years (18 months) is actually assigned in half day rather than full day blocks (Figure 3).

During the year 1971-72, 34 residents were in training within the Affiliated Community Hospital Training Program. This year some 50 residents have been training within the program. The distribution of these residents is demonstrated in Table 2. The graduate education program (residency program) also has several unique efforts

FAMILY PRACTICE

This outline indicates emphasis in terms of time commitments and does not present actual sequence of educational elements.

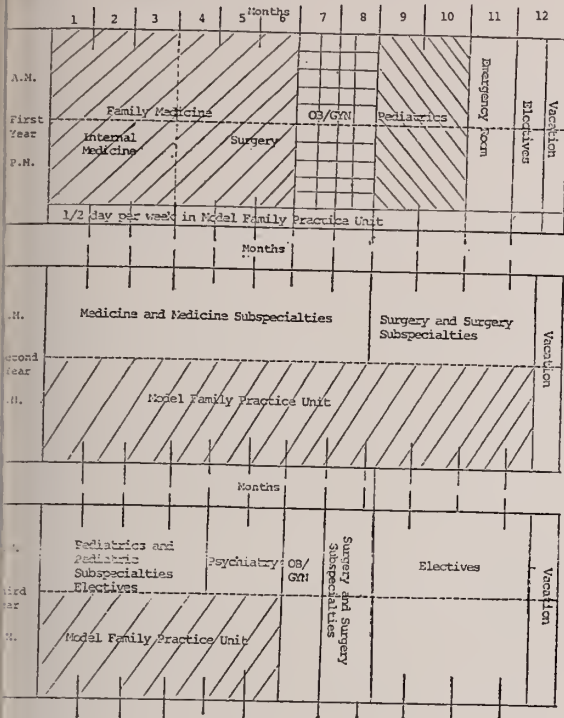


Figure 3

connected with it which are of interest.

1. Several of the hospitals have made available student clerkships for Senior students of medical schools other than the University of Minnesota which in effect brings graduates of other medical schools into the State of Minnesota.
2. The Department of Family Practice has arranged preceptorships for students of other medical schools with physician preceptors within the State of Minnesota.

Both of the above mechanism tend to develop interest in a medical career within the State of Minnesota for students who have not been trained at the expense of the State of Minnesota.

3. We have initiated an experimental rehabilitation program by accepting a physician for re-training following a severe bout of mental illness. The purpose of this program is to rehabilitate physicians who may have become

TABLE 2

Affiliated Hospital Resident Distribution

	1971-72	1972-73	1973-74	1974-75
University	3 (0-3-0)	1 (0-1-0)	8 (6-2-0)	14 (6-6-2)
St. John's	3 (3-0-0)	9 (6-3-0)	14 (6-5-3)	18 (6-6-6)
Bethesda	9 (9-0-0)	17 (12-5-0)	22 (8-9-5)	24 (8-8-8)
Fairview/				
St. Mary's	13 (9-3-1)	10 (5-2-3)	19 (9-8-2)	26 (9-9-8)
Methodist	6 (5-1-0)	8 (4-4-0)	12 (6-3-3)	15 (6-6-3)
North				
Memorial	—	4 (4-0-0)	12 (8-4-0)	18 (8-6-4)
	34	49	87	115

**Numbers in parenthesis indicate the distribution by year of program.

incapacitated due to alcoholism or other drug problems, mental illness and in some instances perhaps physical incapacitation.

Each of these efforts are directed towards the economical production or conservation of physician services within the State. The University of Minnesota Department of Family Practice and Community Health is academically related to Hennepin County General Hospital's Department of Family Practice and St. Paul Ramsey's Department of Family Practice. In each instance, the faculties of these two institutions are members of the faculty of the Department at the University. The residency training programs in Family Practice of our three institutions will have an annual output of approximately 60 physicians per year.

Summary

The health care needs of the State of Minnesota will require an acquisition of 125 new family physicians annually for the next ten years. The University of Minnesota Department of Family Practice and Community Health has assumed a responsibility to maintain and stimulate student interest in a career in Family Practice. The Department, together with the residency training programs at Hennepin County General Hospital and St. Paul Ramsey Hospital will reach an annual output potential of 60 family physicians per year in 1975. The feasibility of additional training programs for Family Practice or new mechanisms to attract family physicians to the State should be exploited.

Dr. Dean Fleming Honored

Dr. Dean S. Fleming, Hopkins has been honored by the Minnesota Respiratory Health Association with the Herman Kleinman Award.

The award was presented recently at the annual membership meeting of the state Christmas Seal Association.

Dr. Fleming is director of the Division of Disease Prevention and Control of the Minnesota Department of Health.

The Commercial Boundaries of Rural Communities

STEPHEN NYE BARTON* and JOHN O'LEARY, M.D.†

THE BUSY PHYSICIAN is aware that patients from one locality will tend to seek his services while those from another area may go elsewhere. Patients who travel to a community seeking goods and services may follow the same routes when seeking medical care. A knowledge of trade boundaries and traffic flow patterns is of value to the physician or group considering a rural practice. In Southwestern Minnesota six doctorless communities seeking a physician participated in a project to identify potential health service geographic patterns: Jeffers, Lamberton, Revere,

Storden, Wabasso, and Wanda.

Commercial Survey

In 1913 Galpin identified trade boundaries in rural communities by asking local merchants to locate their customers on a county map. He suggested that the "trade zone" of a town was the real boundary of a "community."¹ The work of Kolb and Day concluded that general trade was the best method of delineating the boundary of a community.²

In the present study a modified Galpin approach was used to analyze business trade area perimeters. A map was mailed to every known business in the study area with instructions to draw lines encompassing the source of 90% and

*Senior medical student at the University of Minnesota Medical School and Research Associate in the Department of Family Practice and Community Health.

†Associate Professor, Department of Family Practice and Community Health, University of Minnesota.

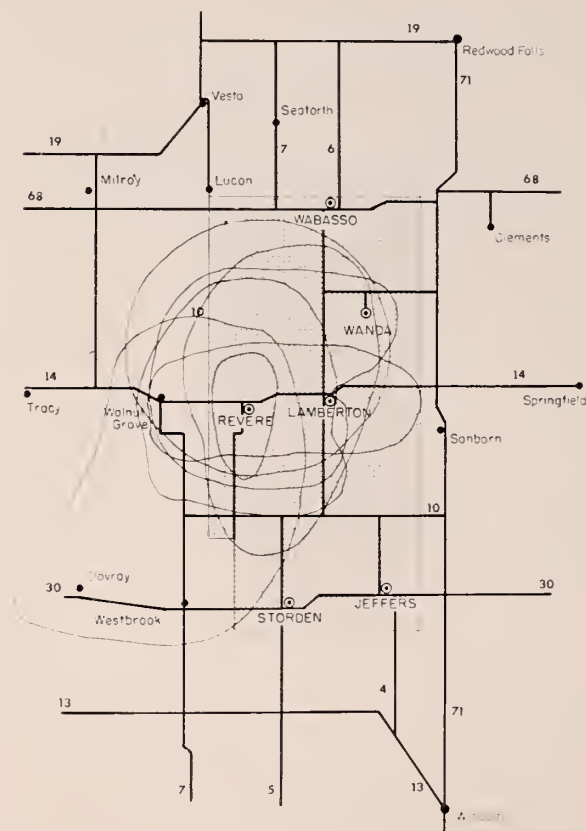


Fig. 1—Revere composite trade configuration; 50% perimeter.

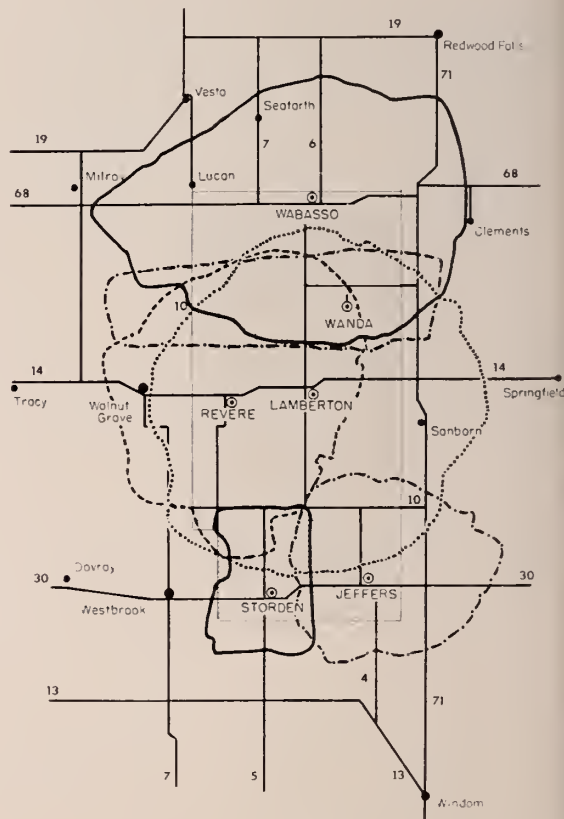


Fig. 2—Commercial boundaries of six rural communities; 50% perimeter.

50% of the customers. A demonstration map with sample trade perimeters was included so that the businessman would understand precisely what was desired. Survey cooperation was enhanced by identifying a representative from each of the six communities in a cover letter. Of the 104 businesses surveyed 72 responded.

A composite map for each town was created by tracing each business perimeter onto a common map for its town. Only the 50% perimeter was included for the purpose of this analysis. A composite map for Revere is shown in Figure 1. As anticipated, the trade perimeters were irregular.

A summary trade map was constructed to identify the trade configuration relationships between the six communities. The map was made by taking the greatest possible trade perimeter for each of the six communities with the requirement that at least two businesses identified the territory within the perimeter at a given point as being the source of customers within their 50% trade perimeter (Figure 2).

Traffic Flow Patterns

An understanding of traffic flow patterns is crucial in identifying natural trade routes. Haga and Folse in a survey of rural villages in central Illinois concluded that as village size decreased, improved roads influenced trade patterns.³ To understand the relationship of the six communities to surrounding resources, traffic flow patterns in Southwest Minnesota were analyzed.

State and county traffic flow maps are available from the Minnesota Department of Highways. The change in the quantity of traffic flow is indicated by shaded areas over the roads; the greater the width of the shaded area, the greater the traffic flow. Individual traffic flow counts are available for all highways and roads in the state of Minnesota.

The graphic description of traffic flow for

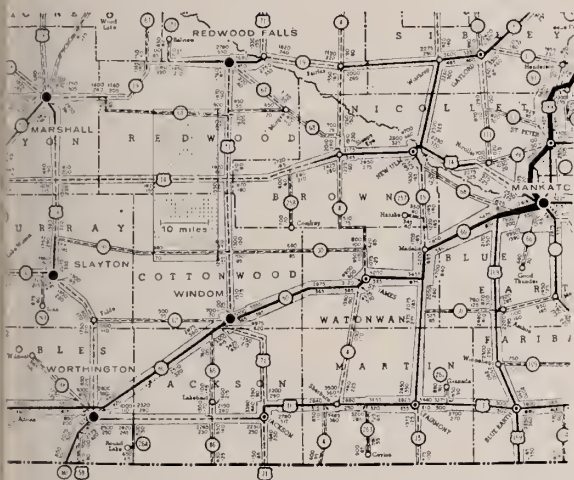


Fig. 3—Traffic flow in Southwestern Minnesota

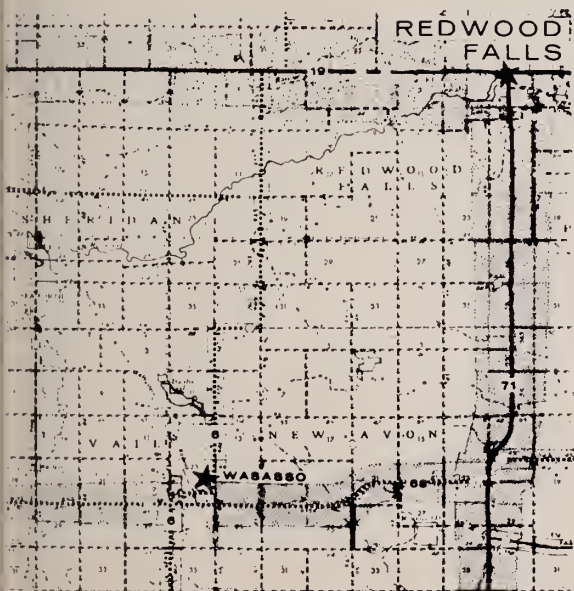


Fig. 4—Traffic flow towards Redwood Falls.

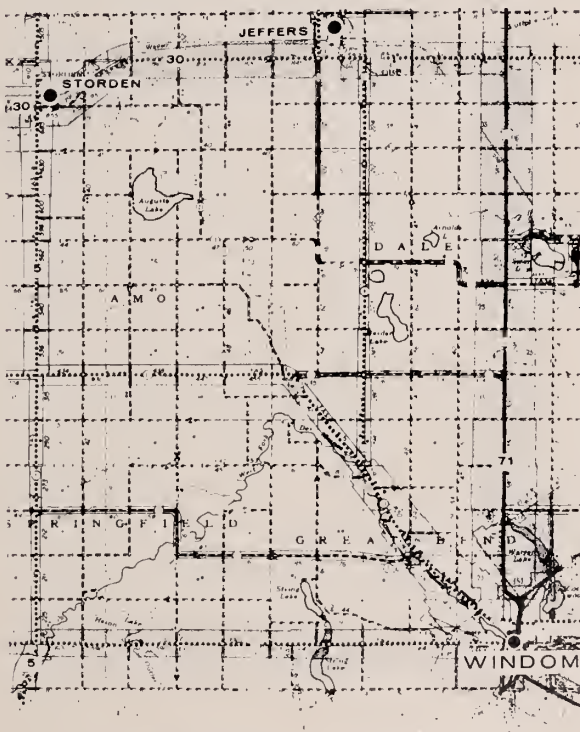


Fig. 5—Traffic flow towards Windom.

southwestern Minnesota (Figure 3) reveals that the six communities are central to four traffic flow centers: Marshall and Redwood Falls are hubs north of the six communities; Slayton and Windom are hubs to the south. On major highways in Southwestern Minnesota traffic builds from west to east towards Mankato and Minneapolis.

County traffic flow maps indicated that Lamberton had the greatest average traffic flow of the six communities. Traffic flow increased from Wabasso towards Redwood Falls to the north

(Figure 4); and from Storden and Jeffers to Windom in the south (Figure 5).

Conclusion

Two methods for identifying the dynamic boundaries of rural trade areas have been described. Commercial trade surveys and traffic flow analysis may be used to identify dynamic relationships between communities and potential health service geographic patterns or trends. These techniques will aid primary care physicians considering rural locations for practicing medicine.

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Suddenly a palsied chill
Struck from the paved level up my limbs,
And was ascending quick to put cold grasp
Upon those streams that pulse beside the throat:
I shriek'd, and the sharp anguish of my shriek
Stung my own ears—I strove hard to escape
The numbness; strove to gain the lowest step.
Slow, heavy, deadly was my pace: the cold
Grew stifling, suffocating, at the heart;
And when I clasp'd my hands I felt them not.
One minute before death, my iced foot touch'd
The lowest stair; and as it touch'd, life seem'd
To pour in at the toes: I mounted up.*

John Keats: "The Fall of Hyperion. 11:122-134. 1819.

The New Curriculum at the Minneapolis Campus

A Description and Preliminary Report

ROBERT J. McCOLLISTER, M.D.*

BY JUNE, 1973, THE first full class of medical students will have completed all requirements of the new curriculum of the University of Minnesota Medical School at Minneapolis. The new program has been a central concern of the faculty for more than six years requiring planning, revising, teaching, evaluating, and comparing. This paper describes how the program came about, outlines the features of the curriculum, and presents preliminary information on the achievement of the students who have constituted the inaugural class.

In 1964 the Constitution governing the organization of the Medical School was approved. The Educational Policy Committee,[†] was charged with the responsibility for curriculum planning and evaluation, and set to work gathering information on curricula at other schools, discussing the future of health care and medical practice and hearing from a wide variety of interested individuals and groups. Faculty retreats, extensive discussion with students, faculty, physicians in full-time practice and others were an integral part of the process essential to develop the revised program. Nearly three years elapsed from the start of the Committee's work to the fall of 1969 and the inauguration of the revised curriculum.

The Committee endorsed four goals which influenced later planning: (1) flexibility, (2) student as learner, (3) relevance, (4) improved faculty communication. Three goals relate directly to the needs of medical students now in training: "flexibility," because students come to medical school from diverse educational backgrounds and go on to a variety of career goals; "student as learner" to focus on the key aspect of the educational process, the student and his attitude toward medical education as a self-initiated, self-directed process, to become a lifetime professional habit; and "relevance," to be mindful of the need for continuing critical review of burgeoning scientific

information to identify core knowledge essential in preparation for medical practice. The fourth goal, "improved faculty communication," is viewed as a means to enhance the educational process through exchange and understanding among the faculty and between students and faculty.

The curriculum plan devised to promote these goals was outlined at the outset, in Phases. This term was chosen because Phase did not connote a particular time limit. In the latest modification of the new plan, Phase A and Phase B each require one calendar year for completion.

Phase A is four quarters in length, extending from fall to early August (Figure 1). The traditional basic medical science subjects are included in this Phase: anatomy, biochemistry, microbiology, pathology, physiology and introductory pharmacology. In addition, students are introduced to clinical medicine by means of small group sessions on patient care, history taking and physical diagnosis, the latter in the third and fourth quarters. A course in behavioral science related to medicine is included early in Phase A. To provide an opportunity for students to discuss their problems relating to the curriculum program, medicine and society, or to personal concerns, small group discussion sessions are available on an optional basis. The student completing Phase A should possess a wealth of basic

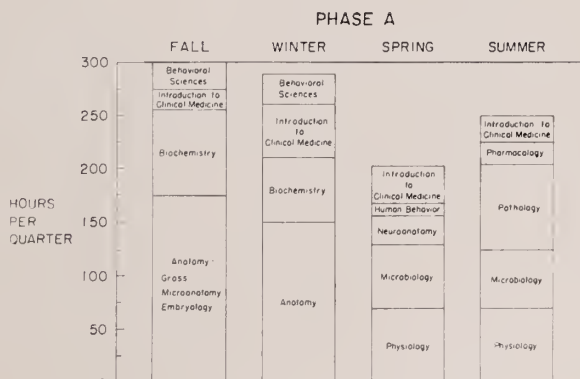


Figure 1

*Assistant Dean and Curriculum Coordinator.
[†]Drs. Richard Ebert (Chairman), Richard Varco (Vice-Chairman), Wallace Armstrong, Ellis Benson, Eugene Grim, Donald Hastings, Carl Heggstad, Robert Ulstrom, Dennis Watson, H. M. Savert (ex-officio), R. J. McCollister (ex-officio).

scientific knowledge together with suitable attitudes and skills to facilitate his pursuit of advanced medical knowledge at the bedside.

Phase B (Figure 2) represents the sharpest departure from the traditional arrangement of a second year in medical school. Phase B didactic teaching is organized along organ or system lines, with responsibility delegated to interdisciplinary teaching committees rather than to departments. The teaching committees are assigned core hours, ranging from 17 to 50 or more, depending on subject area. These multidisciplinary committees identify course objectives, plan presentations, and evaluate student performance. Most committees have developed syllabuses which represent the core content of the subject area. In addition, the committees develop optional activities for unscheduled time. The clinical experiences in Phase B have been organized within a single course, "Student as Physician," which extends through the four quarters of the Phase. Students participate in hospital, outpatient and office medical care in groups of two or three under tutors. Students are assigned patients in medicine, pediatrics, family practice, surgery, physical medicine and rehabilitation, obstetrics-gynecology, neurology and psychiatry. During these successive assignments the student studies intensively 50 to 100 patients with a variety of medical problems. Tutors are recruited from the full-time and part-time faculty. In family practice, surgery and obstetrics-gynecology tutorials, physicians in full-time practice con-

tribute a major share of the teaching effort. By the time the student completes Phase B, he will have been in medical school eight quarters, the equivalent of a status midway through the junior clerkships in the old program. He will have completed nearly all of the formal didactic work, will be prepared to pass Part I of the National Board and will have had experience in all major specialty areas. The student should be prepared to assume responsibility in the full-time clinical courses in the next Phase.

Phase D is organized along pathways of interest designated tracks: medicine and pediatrics, medical specialties including obstetrics, family medicine, surgical specialties, neurological sciences, psychiatry-behavioral science and basic medical science, (Figure 3). During the last quarter of Phase B, the students begin to plan their Phase D programs. This involves first, a choice of track of interest and an advisor. In each track, courses are strongly recommended for inclusion in the individual's program. For example, students in the medicine track are counseled to include, as a minimum, six-week externships in medicine, surgery, neurology and obstetrics-gynecology in their Phase D plans. All track recommendations include externships in medicine and surgery and all include a component of basic science courses. Thus, there is considerable overlap among the several tracks in the strongly recommended components.

This curriculum permits a student to complete medical school in eleven quarters: eight quarters in Phases A and B plus three quarters of Phase D work. This is designated the three-year option. Most students have not availed themselves of this accelerated program, preferring instead a four-year program, with 13 total quarters of work and

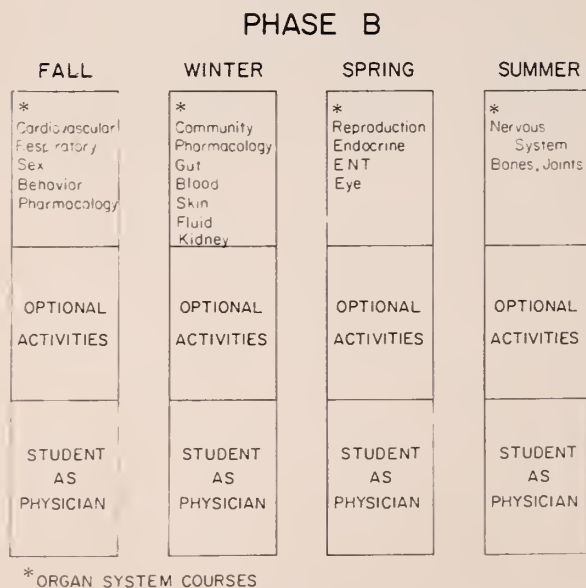


Figure 2

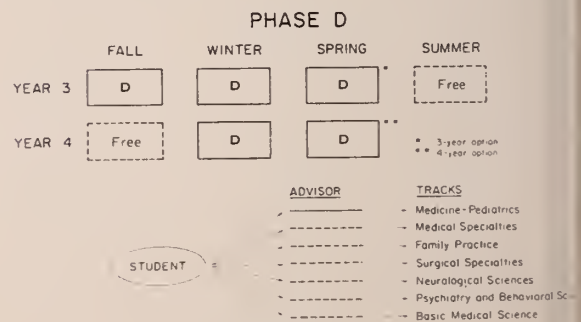


Figure 3

quarters of free time. Figure 4 shows one of several possible arrangements of the four-year program.

By June of 1973, the first class completing the new curriculum will be graduated. Thirty-one of the entering class of 162 elected to graduate in June of 1972, after completing three quarters of Phase D. Their classmates who remained for an additional year took a variety of programs: some took the third year on the Rural Physician Association Program and are now completing the three additional required quarters of Phase D courses, while others took an assortment of courses, interspersed with free time.

All preliminary evaluations of the students' performance indicate satisfactory achievement, in comparison with those of former years. On the Part I test of the National Board of Medical Examiners, students achieved a higher average level of performance in five of the six subtests and remained at the same level in one, with an average percentile increase in the class score on the total test at nearly 10 percent, when compared with the old curriculum students who took Part I test one year earlier.

On Part II of the National Boards, only preliminary information is available, since many students will not take this until spring, 1973. But 31 students who graduated on the shorter,

optional program in 1972 took this test as required, before graduating and they did as well, on the total test, as did the students who graduated under the old curriculum after completing four years' study. The accelerated graduates were a self-selected group and in many ways not comparable. Nonetheless, the new curriculum students were afforded the opportunity to accelerate, took it and did well by the Part II standard of comparison.

In ratings of the new curriculum students on clinical performance in full-time externship duties, evaluations have been comparable to old curriculum students. A comparison of students from the new curriculum with the old, working side by side in externships in medicine, surgery, pediatrics and obstetrics-gynecology fall and winter, 1971-72, showed them significantly better with patient records, case presentations and use of the library. In "histories" and "physicals" in the obstetrics-gynecology program, the old curriculum students did significantly better. Students who had come along through the clerkship system were better prepared for externships in this specialty. There were no statistically significant differences in level of performance of the old curriculum four-year and new curriculum four-year students in 16 categories rated when all specialties and periods were combined. Table 1 shows the comparison between the groups of students in the several categories rated.

The competition for internships is another area in which the new curriculum group may be meas-

One possible 4-year program
showing summer - fall free quarters

Fall	Winter	Spring	Summer
A	A	A	A
B	B	B	B
D	D	D*	
	D	D**	

* graduation in 11 quarters

** graduation in 13 quarters

Figure 4

TABLE 1
Comparison of Clinical Performance
in externships in medicine, surgery, pediatrics
and obstetrics-gynecology, fall and winter, 1971-72

	New curriculum students in the 3rd year of a 4-year program. n = 250	Old curriculum students in the 4th year of a 4-year program. n = 124
1. Rapport	3.15	3.14
2. Histories	3.11	3.07
3. Physicals	3.11	3.08
4. Patients records	3.11	3.14
5. Synthesizes	3.15	3.19
6. Lab tests	3.06	3.09
7. Therapy plan	3.10	3.08
8. Presentations	3.14	3.12
9. Responsibility	3.29	3.32
10. Use of library	3.11	3.11
11. Initiative	3.29	3.28
12. Stability	3.20	3.30
13. Appearance	3.17	3.22
14. Team relationships	3.21	3.27
15. Knowledge	3.13	3.10
16. Overall potential	3.17	3.15

4 = outstanding, 3 = very good, 2 = adequate, 1 = below adequate.

ured. The final data for the entire first class is not yet available; however, of the 31 students who went on to internships in June, 1972, the pattern of hospitals to which the students matched was comparable to the other 1972 graduates. In Table 2, the two groups are compared.

The years 1969-73 have been a time of curriculum change and intensive evaluation. Studies of new curriculum student performance on National Board tests, clinical work and internship choice have provided data for comparisons between the new and old curriculum students. Those on the new program have earned better basic science board scores and have done better in some aspects

of clinical work. The results to date represent an encouraging first stage of a comprehensive evaluation of this new program.

TABLE 2
Internship Comparison

	n =	11 quarter graduates	13 quarter graduates
Number Minnesota internships	%	31 68	18 5
Interning at major teaching programs	%	100*	8
Getting first choice	%	62	6
Interning in straight programs	%	23	2

*Teaching hospital internship is required of 11-quarter graduates.

The city lies sleeping;
The morn, to deplore it,
May dawn on it weeping:
Sullenly, slowly,
The black plague flew o'er it—
Thousands lie lowly;
Tens of thousands shall perish;
The living shall fly from
The sick they should cherish;
But nothing can vanquish
The touch that they die from.*

*Byron: Manfred, II.iii. 34-44. 1817.

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Minnesota Graduates: 1896 to 1971

JUDITH GARRARD, PH.D.*

By 1971, the number of living graduates of the University of Minnesota Medical School had grown to over five thousand individuals. Demographic information about these graduates would be helpful in planning undergraduate curriculum changes and in assessing the impact of these changes on future graduates. In June 1971, data concerning geographical location, type of practice, and specialty of all living graduates were obtained by the Medical School from the American Medical Association. A summary of this information is described here.

Postgraduate Training

Practically all graduates since 1896 have had internship training. Half (48%) of these internships have been in Minnesota, with the majority at three major Twin Cities hospitals: Hennepin County General, University of Minnesota, and St. Paul Ramsey.

Residency training has been taken by fifty-five percent of the Minnesota graduates over the past 75 years. Like the distribution of internships,

half of the residencies have been in Minnesota. The Veteran's Administration and University of Minnesota Hospitals have been the two major residency training centers of Minnesota graduates.

Distribution of Physicians

Although Minnesota graduates are currently practicing in all fifty states, 47% are located in Minnesota (Table 1). This compares favorably with the national average: In 1967, 43% of the graduates of all U.S. medical schools were located in the state of their medical school graduation.¹

There appears to be a strong relationship between location of current practice and location of postgraduate training. As shown in Table 2, two-thirds of the graduates currently located in Minnesota took their internships here; whereas only one-third of the Minnesota graduates practicing elsewhere took their internship in Minnesota. The contrast is even greater with regard to residency training. Of the graduates currently practicing in other states, 27% took a Minnesota residency; whereas, 80% of the Minnesota based graduates took residencies in this state.

Table 3 summarizes the distribution of Minnesota physicians in metropolitan and non-metropolitan counties. This shows that the majority of all Minnesota physicians, regardless of medical school background, are in the major metropolitan counties (Anoka, Carver, Dakota, Hennepin, Olmsted, Ramsey, St. Louis, Scott, and Washington). A greater proportion (24%) of the Minnesota graduates practice in the non-metropolitan counties in Minnesota than do graduates of other medical schools (15%).

The distribution of physicians by size of town

*Curriculum Evaluator, Medical School, and Assistant Professor, Department of Physical Medicine and Rehabilitation, University of Minnesota Medical School, Minneapolis, Minnesota. This research was supported in part by NIH Grant No. 18 ME 00109 02.

TABLE 1
Location of Living Minnesota Graduates
1896-1971

Location	Number	Percent
Minnesota	2630	(47%)
North Dakota	70	(1%)
South Dakota	56	(1%)
Iowa	50	(1%)
Wisconsin	135	(2%)
Other States	2631	(48%)
Total	5572	(100%)

TABLE 2
Location by State of Internship and Residency

Location of Internship	U.M. Grad Currently located in states other than Minnesota	U.M. Graduate Currently located in Minnesota	Total
Minnesota	1026 (36%)	1667 (66%)	2693 (50%)
Non-Minnesota	1823 (64%)	874 (34%)	2697 (50%)
Total	2849 (100%)	2541 (100%)	5390 (100%)
Residency			
Minnesota	482 (27%)	1085 (80%)	1567 (50%)
Non-Minnesota	1322 (73%)	264 (20%)	1586 (50%)
Total	1804 (100%)	1349 (100%)	3153 (100%)

MINNESOTA GRADUATES

TABLE 3

	Minnesota Medical School Graduates	Graduates of Other Medical Schools§	Total
Metropolitan counties in Minnesota*	2003 (76%)	2757 (85%)	4760 (81%)
Non metropolitan counties in Minnesota†	627 (24%)	476 (15%)	1130 (19%)
Total	2630 (100%)	3233 (100%)	5863 (100%)

*Metropolitan counties are: Anoka, Carver, Dakota, Hennepin, Olmsted, Ramsey, St. Louis, Scott and Washington.

†Non-metropolitan counties are all other counties.

‡Source: AMA computer tape, June, 1971.

§AMA: Distribution of Physicians in the U.S., December, 1971.

is given in Table 4. Here the data show that 25% of the Minnesota graduates practicing in Minnesota are in towns with a resident population of 25,000 or less. Comparative data for non-Minnesota graduates are not currently available.

Distributions of physicians by type of practice are given in Table 5 for physicians throughout the U.S., in Minnesota (regardless of medical school background) and for Minnesota graduates. A separate category for Family Practice is not listed by the American Medical Association in its most recent publication of physician distribution;² therefore, in this analysis, Family Practice and General Practice are combined.

Thirty-three percent of the Minnesota graduates currently located in Minnesota identify themselves as being in General or Family Practice. This is considerably higher than the national average of 17% of all U.S. physicians or that of 21% of the

physicians in Minnesota (regardless of medical school background).

Data regarding the different specialties recognized by AMA and categorized as medical, surgical, or other are also given in Table 5. In general, the differences among physicians in the U.S. and Minnesota compared with Minnesota graduates are not as striking as in the general or family practice category.

Thirty-nine percent of all Minnesota graduates have been certified by one or more of the American Specialty Boards. This is comparable to the national average of 34% of all U.S. medical school graduates.¹ The data reported in Table 5 are the number of certifications granted, which is greater than the number of physicians who received certification. For example, 83 Minnesota graduates are certified in two specialties. The number of certifications is comparable between U.S. physicians and Minnesota graduates within each of the specialties.

Summary

This report summarizes the professional characteristics of all living graduates of the University of Minnesota Medical School from 1896 to 1971. The information described here includes geographical location by state, county, and size of city, location of internship and residency training, type of general specialty practice, and certification by an American Specialty Board. These data were obtained by the Medical School from the AMA in June, 1971, for purposes of educational planning and future evaluation of the undergraduate medical curriculum.

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2. Roback GA: Distribution of physicians in the U.S., 1972. Chicago: American Medical Association, 1972.

A country doctor needs more brains to do his work passably than the fifty greatest industrialists in the world require.—Walter B. Pitkin [1878-1953].

MINNESOTA GRADUATES

TABLE 5
General and Specialty Practice

	All Physicians* in U.S.	All Physicians* in Minnesota	Minnesota† Graduates in U.S.	Minnesota Graduates in Minnesota‡
General Practice and Family Practice	53,737 (17%)	1,215 (21%)	1,398 (25%)	859 (33%)
Medical Specialties	73,553 (24%)	1,356 (23%)	1,168 (21%)	476 (18%)
Allergy	1,562 (1%)	19 (‡)	28 (1%)	10 (‡)
Cardiovascular Diseases	5,519 (2%)	88 (2%)	63 (1%)	23 (1%)
Dermatology	3,770 (1%)	81 (1%)	103 (2%)	39 (2%)
Gastroenterology	1,612 (1%)	37 (1%)	23 (‡)	7 (‡)
Internal Medicine	40,858 (13%)	832 (14%)	627 (11%)	280 (11%)
Pediatrics	17,625 (6%)	239 (4%)	265 (5%)	89 (3%)
Pediatric Allergy	373 (‡)	8 (‡)	6 (‡)	2 (‡)
Pediatric Cardiology	475 (‡)	20 (‡)	12 (‡)	6 (‡)
Pulmonary Diseases	1,759 (2%)	32 (1%)	41 (1%)	20 (1%)
Surgical Specialties	82,918 (27%)	1,427 (24%)	1,200 (22%)	588 (22%)
General Surgery	28,264 (9%)	482 (8%)	373 (7%)	183 (7%)
Neurological Surgery	2,505 (1%)	65 (1%)	40 (1%)	20 (1%)
Obstetrics and Gynecology	18,634 (6%)	250 (4%)	197 (4%)	101 (4%)
Ophthalmology	9,655 (3%)	183 (3%)	229 (4%)	111 (4%)
Orthopedic Surgery	9,125 (3%)	192 (3%)	145 (3%)	73 (3%)
Otolaryngology	5,097 (2%)	80 (1%)	77 (1%)	35 (1%)
Plastic Surgery	1,589 (1%)	19 (‡)	16 (‡)	7 (‡)
Colon and Rectal Surgery	643 (‡)	21 (‡)	12 (‡)	9 (‡)
Thoracic Surgery	1,739 (1%)	24 (‡)	16 (‡)	7 (‡)
Urology	5,667 (2%)	111 (2%)	95 (2%)	42 (2%)
Other Specialties	79,292 (25%)	1,486 (25%)	1,426 (25%)	504 (20%)
Aerospace Medicine	210 (‡)	7 (‡)	20 (‡)	2 (‡)
Anesthesiology	10,863 (3%)	175 (3%)	107 (2%)	51 (2%)
Child Psychiatry	2,085 (1%)	22 (‡)	36 (1%)	9 (‡)
Forensic Pathology	1,659 (1%)	43 (1%)	50 (1%)	20 (1%)
Diagnostic Radiology	184 (‡)	1 (‡)	3 (‡)	1 (‡)
Neurology	2,805 (1%)	145 (2%)	56 (1%)	35 (1%)
Occupational Medicine	2,351 (1%)	33 (1%)	49 (1%)	18 (1%)
Psychiatry	19,986 (6%)	224 (4%)	304 (5%)	102 (4%)
Pathology	9,697 (3%)	218 (4%)	172 (3%)	66 (3%)
Physical Medicine and Rehabilitation	1,260 (‡)	48 (1%)	29 (1%)	14 (1%)
General Preventive Medicine	610 (‡)	5 (‡)	19 (‡)	2 (‡)
Public Health	2,439 (1%)	28 (‡)	88 (2%)	18 (1%)
Radiology	10,540 (3%)	198 (3%)	238 (4%)	103 (4%)
Therapeutic Radiology	813 (‡)	19 (‡)	16 (‡)	2 (‡)
Other Specialty	6,149 (2%)	132 (2%)	239 (4%)	94 (4%)
Unspecified	30,558 (10%)	567 (10%)	380 (7%)	170 (6%)
Total	312,417 (100%)	5,863 (100%)	5,572 (100%)	2,630 (100%)

*Source: AMA Distribution of Physicians, December, 1970, pg. 54.

†Source: AMA Computer Tape, June, 1971.

‡Percentage is less than 1%.

TABLE 6
Number and Percent of Specialty Board Certifications Granted

Specialty Board Certification	Physicians* in U.S.	Minnesota† Graduates in U.S.	Minnesota† Graduates in Minnesota
Anesthesiology	3,963 (4%)	67 (3%)	32 (3%)
Colon & Rectal Surgery	301 (‡)	10 (‡)	7 (1%)
Dermatology	2,279 (2%)	74 (3%)	27 (3%)
Internal Medicine	16,342 (16%)	380 (17%)	177 (19%)
Neurological Surgery	1,186 (1%)	19 (1%)	10 (1%)
Obstetrics/Gynecology	8,439 (8%)	129 (6%)	67 (7%)
Ophthalmology	5,261 (5%)	145 (6%)	69 (7%)
Orthopedic Surgery	4,552 (5%)	104 (5%)	54 (6%)
Otolaryngology	3,936 (4%)	85 (4%)	35 (4%)
Pathology	5,807 (6%)	136 (6%)	48 (5%)
Pediatrics	10,079 (10%)	194 (9%)	67 (7%)
Physical Medicine & Rehabilitation	448 (‡)	19 (1%)	10 (1%)
Plastic Surgery	710 (1%)	8 (‡)	3 (‡)
Preventive Medicine	1,882 (2%)	71 (3%)	14 (1%)
Psychiatry & Neurology	8,065 (8%)	197 (9%)	81 (9%)
Radiology	7,459 (7%)	230 (10%)	83 (9%)
Surgery	14,375 (14%)	266 (12%)	122 (13%)
Thoracic Surgery	1,902 (2%)	44 (2%)	18 (2%)
Urology	2,961 (3%)	60 (3%)	23 (2%)
Total Certifications	99,947 (100%)	2,238 (100%)	947 (100%)

*Source: AMA: Medical School Alumni, 1967.

†Source: AMA computer tape, June 1971.

‡Percentage is less than 1%.

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HEART ATTACK

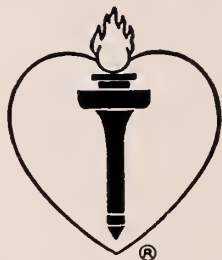
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PRESSURE

INBORN HEART

DEFECTS



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History of Medicine

The Drama of Sulfanilamide, Penicillin and other Antibiotics 1936-1972

WESLEY W. SPINK, M.D.*

WAR, FAMINE and pestilence have always tormented mankind. One of the most beneficial accomplishments in medical history has been the control of infectious diseases during the last one hundred years, and within the past forty the most dramatic therapeutic advances have occurred. I have been primarily engaged in the study and management of infections for more than these forty years, thirty-six of which have been centered at the University of Minnesota Hospital.

I propose to narrate some of the major achievements, to point out some remaining challenges and to conclude with some of the problems created by this advance.

Evolution of Control of Infectious Diseases

No infectious disease has ever been treated out of existence. The key word in the control and eradication of specific infections has been and remains, *prevention*. The evolution of successful control can be discussed under three headings.

First, during the course of human history and long before the emergence of the germ theory of disease, epidemic diseases such as leprosy, plague, smallpox, syphilis, yellow fever and dysentery were considered to be contagious. To meet the challenge, severe quarantine regulations involving international commerce were set up as early as the fifteenth century and not without success. A marked advance occurred in the nineteenth century, induced in great part by the industrial revolution. Although largely ignoring the concept of contagium at times, a spirit of humanitarianism and social reform appeared and resulted in such measures as improved housing, better nutrition, proper sewage disposal, available pure water supplies and the regulation of child labor. During this period good health revolved around changing social, economic and political attitudes.

Second, the explosion of microbiology in the nineteenth century led to the discovery of the specific cause of disease to more intelligent preventive measures in the form of vaccines and to effective therapy with antisera. The spread of disease by insects and animals was also recognized and this knowledge further enlightened efforts toward prevention.

Third, largely through the genius of Paul Ehrlich, the science of chemotherapy and chemoprophylaxis made great strides, especially just before and during World War II. The sulfonamides and antibiotics were introduced for therapy, and insecticides and pesticides as prophylactic agents. I shall dwell largely on this third aspect of the control of infectious diseases since I lived through it and participated in some of the early adventures.

Early Personal Involvement

Since this is largely a personal narrative let me present my introduction to infectious diseases. As a medical student at Harvard in 1929 I fell under the spell of one of the greatest of teachers, Dr. Hans Zinsser, Chairman of the Department of Bacteriology and Immunology. From then on my basic interest was in infectious diseases and internal medicine.

For seven years I engaged in patient care and research in one of the country's largest hospitals in Boston. The leading cause of death was pneumonia. My research centered around streptococcal diseases and gonorrhea, both devastating infections of man. At that time specific treatment for infectious diseases was very limited. It consisted of immune sera for certain types of pneumonia and diphtheria and Ehrlich's arsphenamine, a drug for syphilis that was quite toxic. All of us shared in the depression over the lack of specific treatment.

In 1936, Dr. Perrin Long of Johns Hopkins Hospital, who had completed his training in Boston just before my tenure, told us about the observations of Domagk in Germany in curing streptococcal disease with a red dye, a chemical that turned out to have p-amino benzene sulfonamide, or sulfanilamide, as its active component. Through Dr.

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Long, the late Dr. Chester Keefer and I soon had sulfanilamide in Boston, and we were impressed with our results in both streptococcal disease and in gonorrhea.

Shortly thereafter, on August 1, 1937, I joined the faculty of the University of Minnesota and the staff of the University Hospital, arriving with sulfanilamide "in my back pocket." During the next few years I was encouraged to evaluate the drug throughout the hospital.

On the evening of February 2, 1939 I presented a Sigma Xi Lecture in Northrop Auditorium on "Sulfanilamide and Related Chemicals in the Treatment of Infectious Diseases" (Figure 1). This was a part of a series of lectures on "Recent Developments in Medical Science" celebrating the Fiftieth Anniversary of the Medical School. I gave details of the therapeutic results in several hundred patients, stressing those with pneumonia, streptococcal disease, gonorrhea, suppurative meningitis, and urinary tract infections,¹ and it also resulted in my preparing a monograph on the subject.² The years 1937 to 1942 were exciting because we were living in a new era in medicine.

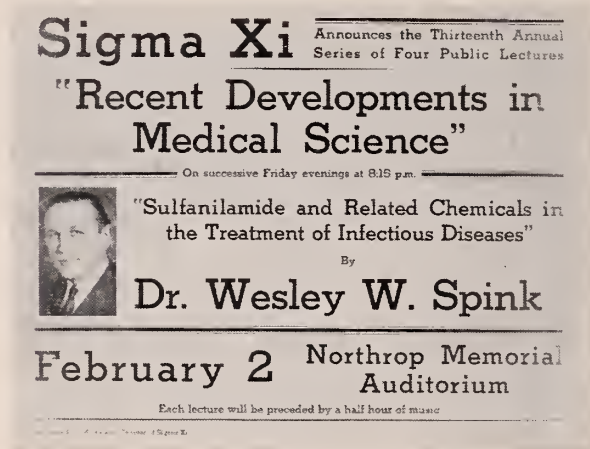


Fig. 1—Poster announcing Sigma Xi Lecture on February 2, 1939 in Northrop Auditorium. Note that the lectures were preceded by music.

Experiences shared by many of us had revealed at the time of the onset of World War II that the sulfonamide drugs had therapeutic shortcomings. There were many infectious diseases that did not respond to this therapy, especially staphylococcal diseases. Furthermore strains of hemolytic streptococci and gonococci had become resistant to sulfonamides, and there existed the possibility that uncontrolled epidemics of streptococcal infections and gonorrhea could appear among military per-

sonnel if other agents did not become available. This apprehension became a reality. As a member of the Hemolytic Streptococcus Commission of the Armed Forces Epidemiological Board I saw hundreds of cases of streptococcal disease, including rheumatic fever, in U. S. Army troops. Fortunately, penicillin had just been made available, though in limited amounts.

Penicillin

The successful development of the antibiotic penicillin, was a product of cooperative effort during World War II. Today, penicillin remains the grandfather of antibiotics and along with its close related derivatives, the agent having the widest application in the treatment of disease.

Penicillin was discovered by Sir Alexander Fleming and described by him in his publication of 1929: "On the antibacterial action of cultures of *Penicillium* with special reference to their use for the isolation of *B. influenzae*"³ (Figure 2). It was an accidental discovery. Working in his small laboratory at St. Mary's Hospital in London he had placed aside a culture plate with colonies of staphylococci on its surface. Weeks later examination of the plate remaining on his bench revealed that the colonies of staphylococci adjacent to the growth of a contaminating fungus, *Penicillium notatum*, had been destroyed, or lysed. Fleming appreciated the significance of this natural phenomenon. He prepared an extract of the fungus called it penicillin, and noted that it inhibited the growth of other bacterial species. Furthermore the agent was not toxic when injected into animals. Dr. Ronald Hare, a contemporary of Fleming's at St. Mary's Hospital, in writing on the history of penicillin stated, "it was, surely, the supreme example in all scientific history, of the part that luck may play in the advancement of knowledge." However, Fleming's finding escaped the attention of most investigators until a decade later when Sir Howard Florey and his associates at Oxford

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1929, Vol. X, p. 226.

ON THE ANTIBACTERIAL ACTION OF CULTURES OF A
PENICILLIUM, WITH SPECIAL REFERENCE TO THEIR
USE IN THE ISOLATION OF *B. INFLUENZAE*.

ALEXANDER FLEMING, F.R.C.S.

From the Laboratories of the Inoculation Department, St. Mary's Hospital, London.

Fig. 2—Reprint of Fleming's first paper on penicillin presented to the author by Sir Alexander. This is a collector's item because of its rarity.

University undertook to isolate penicillin and to extend his observations.

The discovery of Fleming may have been a matter of sheer luck, but his mind had been well prepared for it. Serving with the British Army in France during World War I, he was disturbed by the lack of acceptable antimicrobial substances for wound sepsis. He knew that although certain chemicals destroyed microorganisms, tissue cells were injured as well. The ideal agent ought to eradicate the bacteria without having a toxic effect in the blood or tissues of the host. He brooded on his problem, and several years before his momentous discovery of penicillin he reported that lysozyme obtained from tears, nasal secretion, and egg white was the ideal substance he was looking for.⁵ Florey also recognized this finding of Fleming's. Fleming's techniques were original and extremely simple. In 1954 he came to our laboratory at Minnesota and showed us his techniques in working with penicillin (Figure 3).

When Great Britain became embroiled in World War II the problem of wound sepsis engaged the attention of Florey and his associates

at Oxford. He had had a long-time interest in lysozyme, and as a part of the war effort in the search for an antimicrobial agent he turned to Fleming's penicillin. The most challenging and difficult problem was the extraction of adequate amounts of active penicillin for experimental purposes. But sufficient quantities were finally obtained, and the results of his experiments were published in 1940 under the title of "Penicillin as a Chemotherapeutic Agent"⁶ in a paper of three pages and headed by six authors (Figure 4)! Subsequently, two of these authors, along with Fleming, were awarded the Nobel Prize in Medicine.

PENICILLIN AS A CHEMOTHERAPEUTIC AGENT

BY

E. CHAIN, PH.D. CAMB.	M. A. JENNINGS, B.M. OXF.
H. W. FLOREY, M.B. ADELAIDE,	J. ORR-EWING, B.M. OXF.
A. D. GARDNER, D.M. OXF., F.R.C.S.	A. G. SANDERS, M.B. LOND.
N. G. HEATLEY, PH.D. CAMB.	

(From the Sir William Dunn School of Pathology, Oxford)

THE LANCET 239:226-228, Aug. 24, 1940

Fig. 4—First publication of Oxford Team on penicillin. Florey and Chain received the Nobel Prize with Sir Alexander Fleming.

I knew nothing of Fleming's report, and the paper of Florey and his associates had escaped the attention of most of us because we were engrossed in studies on the sulfonamides, and also because of the war. My first knowledge of penicillin came in a most dramatic manner. One day late in the summer of 1941 I received a phone call from my friend and associate, Dr. Owen Wangenstein, asking if I would join him and a few others at a dinner for Dr. Howard Florey of Oxford. That evening in Minneapolis the story of penicillin was quickly unfolded to us. The penicillin prepared for human subjects had been first administered by a team that included his physician-wife, Dr. Ethel Florey. England was being bombed, and there was no opportunity for Britain to engage in the complicated commercial production of penicillin. Florey was in this country to enlist the Government of the United States and the pharmaceutical industry to produce the antibiotic. The office of Scientific Research and Development established by President Franklin Roosevelt responded to this appeal, and the production of penicillin by 1943 on a large scale is a tribute to a cooperative effort on the part of government and industry.



Fig. 3—Photograph of Sir Alexander (on the left) and the author taken in 1954 at University of Minnesota Medical Center.

As with my contacts with Alexander Fleming, those with Professor Howard Florey continued. After the war I met with him and his associates at Oxford. At that time, a few of us were concerned about a therapeutic problem with penicillin, specifically, the appearance in patients of strains of staphylococci resistant to the action of penicillin. Later Dr. Ethel Florey, then Lady Florey, joined us in our laboratory at Minnesota to explore this problem. Sir Howard Florey was not only a brilliant scientist but an excellent administrator and leader. More formal and restrained than Sir Alexander Fleming, he was generous and most forthright in his analysis of any problem. He ended his career as Lord Florey and Provost at Oxford University.

Trickles of penicillin became available for investigation in 1942 under a Committee of the National Research Council headed by Dr. Chester S. Keefer. We were assigned the task of evaluating the antibiotic in staphylococcal infections. Staphylococcal septicemia carried a mortality rate of 80%, and we had accepted a severe challenge at the University Hospitals. There were few or no guidelines for either the administration of penicillin or of its over-all effects. Our purpose was to aid in the establishment of the basic principles for penicillin therapy.

On July 11, 1942, a seven-year-old girl extremely ill with staphylococcal bacteremia was given the first penicillin in our institution, and as I learned later, she was among the first in the nation to be treated in this manner. Her recovery was dramatic. From then on with my associate, Wendell Hall, up to 200 patients received penicillin from this governmental source without cost to them and with highly satisfactory results.⁷ By 1944 it was apparent that a new epoch in the management of sepsis and infectious diseases had arrived.

Wallace Herrell and his associates at the Mayo Clinic also pioneered in the clinical use of penicillin. Initially, they prepared their own crude penicillin for human use!⁸

Streptomycin

The discovery of penicillin and its successful application in the therapy of infections provided a stimulus to the search for similar antimicrobial agents that would be effective against those diseases for which penicillin was not useful. In 1944, Dr. Selman Waksman and his associates at Rutgers University announced the discovery of streptomycin, which was isolated from a fungus

found in the soil and called *Streptomyces griseus*. Once again the National Research Council and its appropriate committee began an intensive evaluation of this antibiotic.

In 1882, Robert Koch had discovered the germ of tuberculosis, and later Edward Livingston Trudeau, who established the first tuberculosis sanatorium in America at Saranac, New York, wrote "If I could learn to grow the tubercle bacillus outside of the body and produce tuberculosis and will with it in guinea pigs, the next step would be to find something that would kill the germ in the living animal. If an inoculated guinea pig could be cured, then in all probability this great burden of sickness could be lifted from the human race."

Trudeau's dream finally came true in 1942 when the beautiful experimental data of Feldman, Hinshaw and Mann of the Mayo Clinic proved that tuberculosis could be controlled with streptomycin in the highly susceptible guinea pig.¹¹ Over the succeeding years, human tuberculosis responded to streptomycin, and also to dihydrostreptomycin. One of the most outstanding cooperative therapeutic studies ever carried out was the streptomycin studies on tuberculosis by the U. S. Veterans Administration throughout its affiliated hospitals. The staff of the Minneapolis Veteran Hospital played an important role in this effort.

Our own interests in streptomycin were directed toward its possible use as a therapeutic agent for the treatment of brucellosis, or undulant fever, which was prevalent throughout Minnesota, and adjoining states. Neither the sulfonamides nor penicillin were effective. After extensive experimental studies we observed that a combination of streptomycin and sulfadiazine provided a successful therapeutic regime for this disabling disease.¹²

Although streptomycin was effective in other diseases, the drug was found to have two undesirable effects. First, it was toxic, causing damage to the nerve tissue of the ear resulting in dizziness and sometimes permanent loss of hearing. Second, following initiation of treatment bacteria often quickly became resistant to the destructive action of streptomycin. Thus the search continued, particularly by the pharmaceutical industry, for other antibiotics.

Aureomycin

As we reflected on the status of antibiotics in 1948 we hoped for that almost ideal antibiotic with the following characteristics: First, it should be readily administered orally; second, it should

active against a wide spectrum of organisms; and third, it should have minimum toxicity for the host. This was asking almost too much.

In view of our thinking we were surprised to receive as a visitor to our laboratory in 1948 Dr.

Subbarow, Director of Research at Lederle Laboratories. He had been my instructor in biochemistry in medical school. On this visit he told me about an antibiotic that appeared to have the characteristics just described. It was called Duo-gramin, later Aureomycin, or chlortetracycline. We carried out investigations in the laboratory against brucella with this drug and found that it did inhibit growth of the organisms. During the summer of 1948 under the auspices of the National Research Council, Washington, and the Government of Mexico, Dr. A. I. Braude and I carried out successful therapeutic studies with aureomycin in a group of patients seriously ill with chronic brucellosis in Mexico City. Chlortetracycline was the drug that we were looking for in the treatment of human brucellosis,¹³ and it still remains a drug of choice the world over, 25 years later.

Chlortetracycline does have a wide spectrum of antibacterial activity, and it is also of value in the therapy of the rickettsial diseases. It has been found useful for both urinary tract and pulmonary infections. The toxicity of chlortetracycline remains minimal, and resistance to this antibiotic has not been a serious problem.

Other Antibiotics

We now have three groups of semi-synthetic penicillins: Acid-stable preparations such as benzyl penicillin, those having anti-penicillinase activity, which aids in the resolution of the problem of penicillin-resistant strains of staphylococci, and those with a wider antibacterial spectrum such as ampicillin and carbenicillin. Newer antibiotics from different sources include kanamycin, streptomycin, polymyxin, erythromycin and gentamicin. The new cephalosporins include cephalexin and loridine. Again, one can note why penicillin and its relatives are still the greatest of all. They are inexpensive and relatively nontoxic.

It is appropriate at this juncture to cite some of the problems induced by antimicrobial therapy and to look into the future for other developments in the control and management of infectious diseases. While it is likely that epidemics will occur intermittently, especially in the less technologically advanced countries, the one epidemic disease that still poses a threat universally is influenza.

Some Side Effects of Antibiotic Agents

While we have succeeded in controlling and treating the majority of bacterial infections, society is faced with difficult social and medical problems, some of them induced by the agents that have measured our progress.

Prior to the antibiotic era pneumonia was considered to be the old man's friend. It eased him out of this life quickly and relieved him of untold suffering. Antibiotics have added to longevity. These added years are often associated with degenerative diseases, debility due to cerebrovascular accidents, heart disease, cancer, and metabolic disorders. A longer life too frequently is accompanied by neglect, poverty, inadequate medical care, depression and loneliness. This constitutes not only a medical problem but challenges our social order. In the United States today 25 million people are 65 years or older.

Whenever a drug has a wide therapeutic range, appears relatively nontoxic, and is inexpensive, it tends to be used indiscriminately, often with undesirable results. No available drug is devoid of harmful effects. Except under rare circumstances, self medication with antibiotics must be discouraged. First, uncritical therapy has contributed to the appearance of microbes that have become highly resistant to the antibacterial action of the drugs. This is particularly true of the staphylococcus which has become largely resistant to penicillin, and to enteric organisms which have become resistant to other antibiotics. Second, these drugs do have serious side effects, which at times may lead to death or to a state of drug allergy that may prohibit their indicated use for a subsequent serious infection.

What of the Future?

Many basic investigations and therapeutic endeavors will continue to revolve around the viruses. Two outstanding achievements during the few decades in viral research have led to remarkable successes. First, physicists, biochemists and biologists joining forces have added to our vast knowledge in molecular genetics. Studies at a molecular level have yielded information relating to basic cellular activity, including antigen-antibody immune relationships. There is accumulating information indicating that viruses are implicated in at least some forms of malignancy in animals, and possibly in man. One can also speculate that molecular biology will not only advance our

knowledge of viruses and cells in general, but may be utilized in more precise studies on animal and human behavior.

A breakthrough in studies in virology has been the successful growth of large quantities of pure viruses in tissue cultures. As a result many important vaccines have been produced, among them those for poliomyelitis, measles, mumps and German measles.

It is difficult to predict the future for antiviral drug therapy, but it is not unlikely that experimental models will be set up embracing the virus in the disciplines of molecular biology and molecular pharmacology. The important studies on cell membranes have certain implications along these lines, and perhaps out of this combined approach suitable antiviral agents will evolve.

Conclusion

The dramatic impact upon the control of infectious diseases made along the three lines of attack at the beginning of this article is reflected in the marked decline in the incidence and mortality rates from these diseases on a national and state level. Figure 5 illustrates the marked reduction in the incidence of infectious diseases in Minnesota during the past few decades.

After meeting the challenge of infectious diseases for over 40 years, I am now ready to step down and pass the opportunities on to younger hands. I would say to all of you: be ready to meet the opportunity that confronts you so that you, too, may enjoy the drama of the sudden appearance of new knowledge that will contribute to the relief of human suffering.

REPORTED CASES AND DEATHS, SELECTED COMMUNICABLE DISEASES
SELECTED YEARS FROM 1910 TO 1970

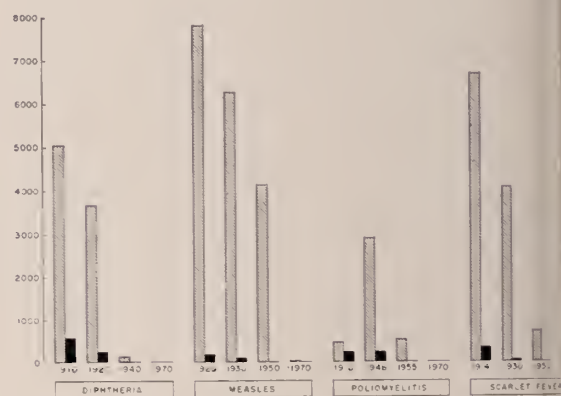
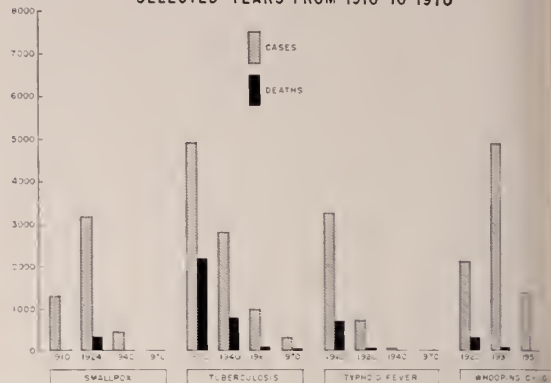
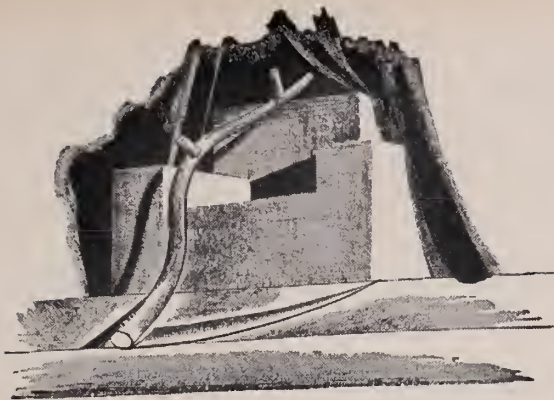


Fig. 5—Showing marked reduction in morbidity and mortality of infectious diseases in Minnesota. (Source: Minnesota Department of Health, Division of Disease Prevention and Control).

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In Memoriam

FREDERICK HAROLD POPPE, M.D.

Dr. Frederick H. Poppe, 90, died February 15, at Miami where he had retired after practicing medicine 50 years. A graduate of the University of Minnesota Medical School and a former professor at the University, Dr. Poppe specialized in surgery in Minneapolis. He was a member of the Hennepin County Medical Society and the American Medical Association and a Life and 50 Club Member of the Minnesota State Medical Association.

Dr. Poppe is survived by his wife, Irma, daughters, Annifred and Diana, and sons, Dr. Frederick P. Poppe and Rev. H. Poppe.

DONALD V. JORDAN, M.D.

Dr. Donald V. Jordan, 73, Minneapolis physician, died February 18. He graduated from the University of Illinois Medical School in 1928.

Dr. Jordan was a member of the Minnesota State Medical Association, Hennepin County Medical Society, American Medical Association and Minnesota Historical Society.

He had no immediate survivors.

ROGER S. COUNTRYMAN, M.D.

Dr. Roger S. Countryman, St. Paul physician, died February 20 in Saratoga, California, where he had been residing since his retirement. He attended the University of Minnesota, graduating in 1920, and moved into his residency in obstetrics and gynecology at Vancouver General Hospital in Canada.

During his private practice in the Twin Cities, Dr. Countryman served as Director of the Prenatal Clinic at the Wilder Dispensary and Chief of the Obstetrical Services at the Charles T. Miller Hospital. He was a member of the Ramsey County Medical Society and American Medical Association and an Associate and Life Member of the Minnesota State Medical Association.

Dr. Countryman is survived by his wife, Dorothy, three daughters and one son.

HARRY R. BAKER, M.D.

Dr. Harry R. Baker, 90, Hayfield physician, died March 26, following a short illness. Born at Wood Lake, Minnesota, he graduated from Hamline Medical School in 1907. Dr. Baker practiced medicine on the Iron Range of the Oliver Mining Company until 1909 when he moved to Waltham, Minnesota. In 1912 he moved to Hayfield where he practiced until his retirement.

He was a member of the American Medical Association, the Zumbro Valley Medical Society, and a 50 Club and Life Member of the Minnesota State Medical Association.

Dr. Baker is survived by his wife, Ella, one son, Dr. Russell L. Baker of Champaign, Illinois, and one daughter, Mrs. Don Gilmer.

ANDREW P. GOBLIRSCH, M.D.

Dr. Andrew P. Goblirsch, 74, Sleepy Eye physician, died February 22. He was born in Wabasso and graduated from the University of Minnesota Medical School.

In 1966, Dr. Goblirsch was honored by the Sleepy Eye Chamber of Commerce for 40 years of service to that community. That same year he was invested as a Knight of St. Gregory, the highest honor that can be bestowed on a layman in the Catholic Church. The appointment was made by Pope Paul VI.

He was a member of the American Medical Association and the Brown County Medical Society and a Life Member of the Minnesota State Medical Association.

Dr. Goblirsch is survived by his wife, Alice, three daughters, Mary Ellen, Judith and Grace. Dr. Albert Goblirsch of Faribault and Dr. Nicholas Goblirsch of Wabasso are his brothers.

DOUGLAS P. HEAD, M.D.

Dr. Douglas P. Head, 74, Minneapolis physician and former professor of medicine at the University of Minnesota Medical School, died April 4. He was the father of Douglas M. Head, former Minneapolis attorney general, and a son of the late Dr. George Douglas Head.

He attended Philips Exeter Academy, Exeter, N.H., and graduated from Yale-Sheffield Scientific Institute in 1922 and from the University of Minnesota Medical School in 1926. He spent 1932 in Vienna in postgraduate study.

Dr. Head retired from the University about five years ago. He was a member of the American Medical Association, the Hennepin Medical Society, the Minnesota Society of Internal Medicine, and a Life Member of the Minnesota State Medical Association.

He is survived by his wife, Ruth, his son, and four daughters, Mrs. Michael Bosanko, Mrs. Douglas Horner, Mrs. Robert Burnett, and Mrs. William Loeffler.

LUVERNE WELLINGTON JOHNSRUD, M.D.

Dr. Luverne Wellington Johnsrud, 62, Hibbing surgeon, died March 11. Born in Mason City, Iowa, he later attended the University of Minnesota Medical School.

He was a former president of the Minnesota Surgical Society and a member of the American Medical Association, the Range Medical Society, and the Minnesota State Medical Association.

Dr. Johnsrud is survived by his wife, Corinne, two sons, Gary and Dr. David Johnsrud, and a daughter, Carol.

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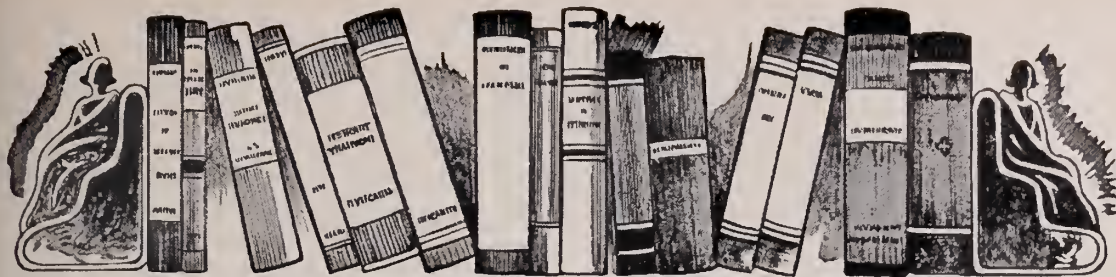
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Book Reviews

BEYOND THE COUCH—Walkenstein, Crown Publishing Company.

Dr. Walkenstein's book **BEYOND THE COUCH** will not endear her to the "medical club," as she puts it, or to psychiatrists in particular. Her opening gambit sets the tone for what follows: "We are living in an age in America where everyone wants to suck a tit and not rough mamas are offering."

Dr. Walkenstein discusses drug abuse as it is practiced by the physician: "Where is the unusual psychiatrist who lets his anxious patient out of his office without tranquilizing pills?" and says further, "There is no tranquilizer that can replace human interaction—on the contrary, it diminishes and limits it." She points out the frustration, anger, and degradation that patients must go through to get medical attention because of the difference of doctors and nurses who show no regard for the dignity of the patient.

She learned early in her internship that doctors perform operations for non-medical, non-health reasons; and states that if the profit motive were removed, there would be a precipitous drop in the number of hysterectomies (or mutilectomies, as she calls them), appendectomies, and tonsillectomies done by surgeons, and in the number of shock therapies administered by psychiatrists.

As one continues to read, the impression becomes a certainty that Dr. Walkenstein is no amateur in the use of pungent and most descriptive four-letter words, both in her writings and with her patients; and even though we are very permissive today in the use of these old Anglo-Saxon four-letter words, there is a barnyard redolence in her writing and in her conversation with her patients. She castigates the medical profession and their belief in the traditional—"Doctors are changeless in rejecting the new and in ostracizing, persecuting, and crucifying anyone in or out of their midst who threatens their additional, secure, boxed-in knowledge; their body of facts that has been taught them, notwithstanding how mad that body lies." She says, with some truth, "When doctors get riled up about quacks and fringy medical people, they somehow seem to protest too much—what is it in themselves they are projecting? The doctor clings to the club for safety . . . the club won't tolerate newly eagles."

Her discussion then centers on the psychiatrist. "Psychiatry in the United States is one big con job and a giant putdown." Dr. Walkenstein goes on to discuss shock therapy, lobotomy, sex education, child raising, marriage, and groups—married and otherwise. In discussing

therapy, she points out that only the personal involvement of the physician cures patients. "No psychiatric tool (technique) ever cured a patient, just as no shovel ever dug a hole." It takes a person to use that tool. "There is no substitute for heart-to-heart, gut-to-gut interaction." The personal touch and contact between doctor and patient is the essence and art of the practice of medicine; and today with the number of patients seeking help, particularly in the psychiatrist's domain, one must have time and more time to develop this kind of rapport which is so necessary to give the patient some kind of relief.

Dr. Walkenstein is brutal in her condemnation of doctors. Her vitriolic condemnation of the majority of physicians is far-fetched and certainly does not include at least 25 percent of our honored profession. This reviewer's impression is that she has unfortunately had contact with "very few decent doctors."

I recommend Dr. Walkenstein's book as well worth reading and thinking about; and if we can be honest with ourselves as physicians and introspective enough, we will begin to see ourselves as she sees us and possibly improve in whatever area of medicine we practice.

Dr. Walkenstein must be given much credit for expressing herself so honestly as to what she has seen and is experiencing in medical practice. Many of her colleagues' voices will be raised in protest, but she will not be drummed out of "the club." She will certainly be sufficiently bruised, however, to earn the Purple Heart.

Milton Abramson, M.D.
Minneapolis, Minnesota

CURRENT DIAGNOSIS & TREATMENT by Marcus A. Krupp and Milton J. Chatton, Lange Medical Publications, Los Altos, California 1973. 996 pp. \$12.00.

The 1973 edition of **Current Diagnosis & Treatment** is out. It covers broad areas of medical practice and is well indexed.

As was indicated in the editor's preface, this book is not intended to be used as a textbook of medicine but to be used as a useful reference book for practicing physicians. The decision to change the publication from annual to biennial seems appropriate since one would not expect enough change in diagnosis and treatment of a given condition to warrant a new edition each year.

It is very handy to have the list of reference articles at the end of each condition. It is well up-dated and this alone may be worth more than the cost of the book.

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Minneapolis, Minnesota

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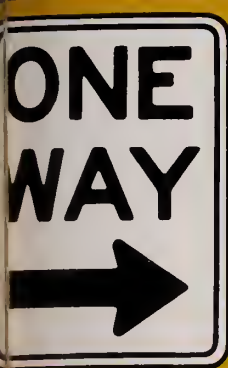
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1. Latlouis, C. J., and Berry, C. C.: Misuse of Prescription Medications by Outpatients, *Drug Intelligence & Clin. Pharm.* 3:270-7, 1969.
2. Braverman, L. E., Ingbar, S. H., and Sterling, K.: Conversion of Thyroxine (T_4) to Triiodothyronine (T_3) in Athyreotic Human Subjects, *J. Clin. Invest.* 49:855-64, 1970.
3. American Druggist BLUEBOOK, March, 1971.

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Precautions: As with other thyroid preparations, an overdosage may cause diarrhea or cramps, nervousness, tremors, tachycardia, vomiting and continued weight loss. These effects may begin after four or five days or may not become apparent for one to three weeks. Patients receiving the drug should be observed closely for signs of thyrotoxicosis. If indications of overdosage appear, discontinue medication for 2-6 days, then resume at a lower dosage level. In patients with diabetes mellitus, careful observations should be made for changes in insulin or other antidiabetic drug dosage requirements. If hypothyroidism is accompanied by adrenal insufficiency, as Addison's Disease (chronic subcortical insufficiency), Simmonds's Disease (panhypopituitarism) or Cushing's syndrome (hyperadrenalism), these dysfunctions must be corrected prior to and during SYNTHROID (sodium levothyroxine) administration. The drug should be administered with caution to patients with cardiovascular disease; development of chest pains or other aggravations of cardiovascular disease requires a reduction in dosage.

Contraindications: Thyrotoxicosis, acute myocardial infarction. **Side effects:** The effects of SYNTHROID (sodium levothyroxine) therapy are slow in being manifested. Side effects, when they do occur, are secondary to increased rates of body metabolism; sweating, heart palpitations with or without pain, leg cramps, and weight loss. Diarrhea, vomiting, and nervousness have also been observed. Myxedematous patients with heart disease have died from abrupt increases in dosage of thyroid drugs. Careful observation of the patient during the beginning of any thyroid therapy will alert the physician to any untoward effects.

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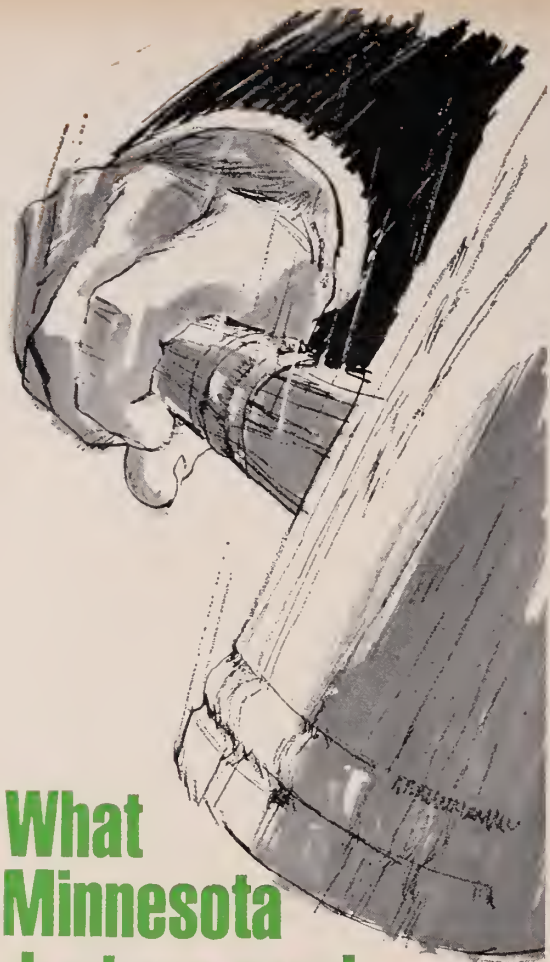
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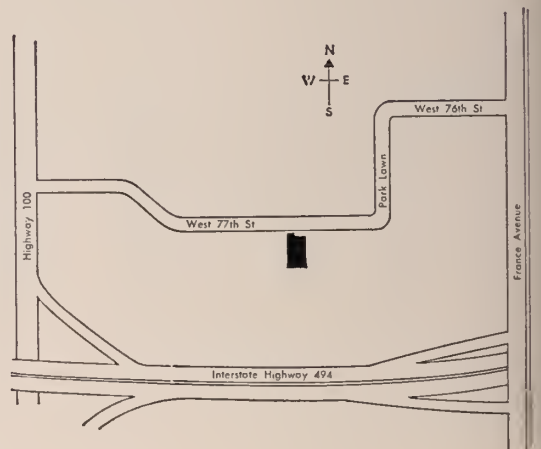
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Precautions: Use during pregnancy is to be avoided.
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recommended.

Contraindications: Known hypersensitivity to flurazepam HCl.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. Caution against hazardous occupations requiring complete mental alertness (e.g., operating machinery, driving). Use in women who are or may become pregnant only when potential benefits have been weighed against possible hazards. Not recommended for use in persons under 15 years

of age. Though physical and psychological dependence have not been reported at recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage.

Precautions: In elderly and debilitated patients, initial dosage should be limited to 15 mg to preclude oversedation, dizziness, or ataxia. If combined with other CNS-depressant drugs, consider potential additive effects. Employ usual precautions in patients who are severely depressed, or who

for 7 to 8 hours without need to repeat dosage during the night

No sleep medication has been as rigorously evaluated in the sleep research laboratory as Dalmane. Insomnia patients given one 30-mg capsule of Dalmane at bedtime, on average: fell asleep within 17 minutes, had fewer nighttime awakenings, spent less time awake after sleep onset, and slept for 7 to 8 hours with no need to repeat dosage during the night.

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pression or suicidal tendencies. Blood counts and liver and kidney tests are advised during therapy. Observe usual precautions of impaired renal or function.

Reactions: Dizziness, drowsiness, lightheadedness, staggering, ataxia have occurred, particularly in debilitated patients. Severe lethargy, disorientation and possibly indicative of drug intolerance, have been reported.

Also reported were headache, heartburn, upset stomach, nausea, vomiting, diarrhea, constipation, GI pain, nervousness, talkativeness, apprehension, irritability, weakness, palpitations, chest pains, body and joint pains and GU complaints. There have also been rare occurrences of sweating, flushes, difficulty in focusing, blurred vision, burning eyes, faintness, hypotension, shortness of breath, pruritus, skin rash, dry mouth, bitter taste, excessive salivation, anorexia, euphoria, depression, slurred speech,

confusion, restlessness, hallucinations; and elevated SGOT, SGPT, total and direct bilirubins and alkaline phosphatase. Paradoxical reactions, e.g., excitement, stimulation and hyperactivity, have also been reported in rare instances.

Dosage: Individualize for maximum beneficial effect. **Adults:** 30 mg usual dosage; 15 mg may suffice in some patients.

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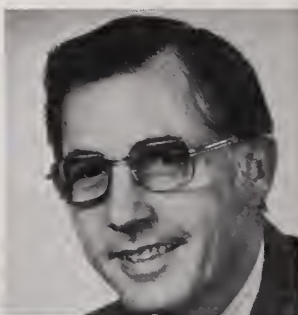
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Opinion & Dialogue

"Prescription drugs – who should determine the maker?"

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Clifton J. Latiolais
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Maker of
Medicine

C. Joseph Stetler
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Pharmaceutical
Manufacturers
Association



"Too many doctors are indifferent to the economic consequences of their decisions." So stated a reader of *Medical News Report* (December 4, 1972), an independent weekly newsletter published by AMA Chief Executive F. J. L. B. game, M.D.

Doctor, are you indifferent...?

In discussing an anticipated increase in Blue Shield rates, Dr. Ingame's newsletter had this to say:

"In general, it can be said that we have given the impression that we are not particularly concerned with the increase in cost of health care for patients..."

"True, an MD's training is primarily scientific, but in the real world of practice, all of his scientific decisions have a price tag, or an economic impact. The economics of health care beckon the practitioner's attention. Concern for economics of medicine..."

When the pharmacist recommends that a drug product other than the one ordered be dispensed, the prescriber invariably permits the change when he feels the best interests of the patient will be served.

Shortcomings of Pro-Substitution Argument

The fact remains that it is essential for the prescriber to know when the change is being contemplated, and to be in a position to consent or demur. Without that opportunity, the unilateral decision of the pharmacist made in the absence of clinical judgment on the part of the physician, on the edge of the patient, could expose the patient to needless risks, and in addition, jeopardize the relationship between the professions of Pharmacy and Medicine. In my view, there is no offset in the pro-substitution argument that offsets these risks.

The Issue of Drug Knowledge

Substitution advocates claim that the primary justification for changing the rules is the desire to better utilize pharmacists' knowledge about drugs. Yet the pharmacist's task to keep current on the entire field of drug therapy, to some extent, puts him at a disadvantage. More often, a practicing physician with his expert knowledge of no more than

should be an obligation of medical practice...

"Medical societies ought to continue campaigns to point out the substantial savings that could be realized thru deductible insurance protection for catastrophic illnesses. At the very least, they should, in the patients' interest, question the policies of any insurance organization that raises health care costs by forcing policyholders to buy insurance they may not need or want and probably won't ever use.

"Too many doctors are indifferent to the economic consequences of their decisions. Too many, for example, habitually hospitalize patients for the convenience of the MD. It's no sense to deny such habits exist...

"Doctors, thru their medical societies, have unhesitatingly appealed to their patients for support in the fight against government interference with the private practice of medicine. At the public in the past has responded. It's time the American Medical Association and state and local medical societies paid off the debt by decisive action to hold down the cost of medical care."

Cost of Drugs

Insurance rates and hospital charges are only two factors in health

care. Drugs that he selects to treat the majority of conditions encountered in his practice. Moreover, the physician's choice of a specific brand is based on his knowledge of the patient's medical history and current condition, and his experiences with a particular manufacturer's product.

Some substitution proponents have argued that the dispensing of a prescription is a simple two-party transaction between the pharmacist and the patient, and that a substituting pharmacist may avoid even a technical breach of contract by simply notifying the patient that he is making a substitution. I would judge that the courts would be sympathetic toward a pharmacist who substituted without physician approval and who undertook a legal defense that seeks to make the patient responsible for the pharmacist's actions.

Reduced Prescription Prices?

Substitution advocates are suggesting to the consumer, and particularly the consumer activist, that reduced prescription prices could justify legalization of substitution. I have seen absolutely no evidence to justify this claim. To the contrary, experience in Alberta, Canada, where substitution is authorized, suggests

care costs. The cost of drugs—both prescription and nonprescription—is another.

And when it comes to drug costs, the nation's pharmacists are concerned. Through their national professional society, the American Pharmaceutical Association, pharmacists are advising the public to use nonprescription medication cautiously and conservatively, and to seek the advice of their pharmacist before selecting or purchasing such drugs.

Outdated Laws

The pharmacist also is aware that when it comes to prescription drugs, often he has an even greater opportunity to reduce the cost to the patient—with no sacrifice in the quality of the medication dispensed. But in many states, outdated and antiquated laws prevent the pharmacist from engaging in drug product selection. "Drug product selection" simply means that the pharmacist functions in the patient's interest by consciously choosing, from the multiple brands available, a low-cost quality brand of the specific drug to be dispensed in response to the physician's prescription order.

Much *misinformation* has been purposely spread by those who stand to gain financially by maintaining

high drug costs to the public. An endless stream of propaganda has emanated from the drug industry in an effort to persuade the medical profession that these so-called anti-substitution laws should be retained. And as long as these laws are retained, the drug industry will continue its current marketing practices which contribute unnecessarily to high drug costs to patients. These practices also are inviting government agencies to expand their restrictive controls on physicians and pharmacists.

APhA Efforts

As pharmacists, we are concerned about health care costs. We hope that every physician shares our concern on this vital issue, and will give his personal support to the constructive efforts APhA has undertaken in the interest of all patients.

(For a complete discussion of drug product selection, you are invited to request a free copy of the "White Paper on the Pharmacist's Role in Product Selection" from: American Pharmaceutical Association, 2215 Constitution Avenue, N.W., Washington, D.C. 20037.)

the opposite.

Many pharmacists understandably are concerned about the cost of maintaining multiple stocks of similar products. While there is no doubt that inventory costs rise when additional brands are stocked, it would be interesting to know how much they rise, and how many pharmacists actually stock *all* brands—of, say, ampicillin or tetracycline—or how long they keep "slow moving" products on their shelves before they are returned for credit. To ask that the industry eliminate multiple sources is to ask competitors to stop competing.

Drug Substitution—A License for the Unethical

Anti-substitution repeal would favor "corner cutting" pharmacists and manufacturers. For them, free substitution would be not a right, but a license. As an aftermath, it is quite likely that the confidence of both physicians and patients in the profession of Pharmacy would be eroded, as revelations about the unconscionable behavior of an undisciplined few were magnified in the press or in professional circles.

Summary

In short, what the American Pharmaceutical Association advo-

cates as a broad-spectrum panacea looks to us to be not only a minority view (advocacy of substitution is by no means a uniform policy in Pharmacy), but also an extraordinarily costly and ineffective remedy, whose side effects are odious. We believe (1) that an impressive majority of pharmacists prefer to work with Medicine and with industry, for the consumer, and for the general good, (2) that they seek the privilege to substitute when the patient might gain and when the patient's doctor agrees, and (3) that they seek to work for the resolution of genuine grievances openly and professionally.

(For amplification of PMA views, please write for our booklet, "The Medications Physicians Prescribe: Who Shall Determine the Source?" It is available from: Pharmaceutical Manufacturers Association, 1155 Fifteenth Street, N.W., Washington, D.C. 20005.)

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President's Letter



THERE IS IN our land a strange unwillingness among some to look and act like what they are. Boys wear long hair and high heels while girls have abandoned cosmetics and frills and taken to denims and boots. Some of this is good for there is no doubt there has been discrimination—at times on the basis of race—at times, religion—at times, sex. Some, however, is merely confusing. The traditional specialization of effort whether based on sex or training or ability has contributed much to man's ability to modify his environment and to make progress.

In our field some of this role confusion also rears its head. Many of us remember certain identifying symbols among hospital people. In those long ago days you could tell a doctor by the coat he wore and possibly by the stethoscope he carried. He was white, starched stiff and usually impeccable although an occasional less compulsive brother might show up in a frayed and even soiled version of white coat. There was a sort of hierarchical designation which started role and function. It was not necessary to buy a program to tell the players.

Gradually the whole thing eroded. All sorts of others began to take on the garb and appearance and even to strive for the duties of what was considered high man on that particular totem pole. The hallowed symbols of physicianship dis-

solved into a sea of anonymity which threatens to engulf our profession.

While this is something of a *reductio ad absurdum*, nonetheless it must be recognized that there are many who resent the pyramid—the image—the power to practice medicine—who continue to espouse the notion that we should all meld into what is known as the “health care team.” There is even some belief that decisions should be made in consort rather than by the only person with the legal and ethical base, as well as the training, to make fundamental medical decisions.

In the proposed system we shall wallow around in a puddle of indecisiveness while the health care team carries out its infinite debate and permits our patients to flounder and wonder, or we can exercise our ancient but still modern function and give leadership where it is so badly needed. In all this mass of alikeness the physician can still be distinguished—not by white coat—not by dangling stethoscope, but rather by his concerned look—his sometime fatigue and his willingness to abjure the 40 hour week—to accept the personal rather than institutional responsibility and to be what he is 24 hours a day while others abandon their role in search of some holy grail. Harry Truman pungently described where the buck stops in the political system. Doctors have always known where the buck stops in the medical system.

A handwritten signature in cursive script that reads "John J. Regan".

President
Minnesota State Medical Association

In Appreciation

It is a sincere pleasure to act as spokesman for the many members of the Minnesota State Medical Association who attended the exciting 1973 Annual Meeting in expressing our deep appreciation to the firms listed below who participated in our Annual Meeting exhibit. The exhibits were tasteful and informative and contributed significantly to the overall quality of this meeting. To each of these firms, I wish to express my personal thanks and I urge each member to acknowledge their participation when visiting with representatives of these firms.

John J. Regan, M.D.
President

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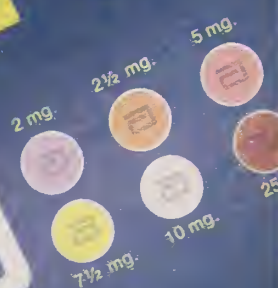
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Chemonucleolysis

ROBERT A. WENGLER, M.D.*

CHEMONUCLEOLYSIS IS THE enzymatic curettage of the nucleus pulposus of the intervertebral disc. After 10 years of clinical trial in man it appears that the procedure has merit as a primary definitive measure in the treatment of lumbar disc syndrome. Investigators presented their findings in a symposium at the annual meeting of the American Academy of Orthopedic Surgeons this past February.

The commonly accepted explanation of the pathogenesis of the disc syndrome is that of compression of a nerve root by a bulging or a protrusion of the annulus fibrosis and/or nucleus pulposus of the intervertebral disc. The validity of this thesis is challenged by the observation that pressure alone on a peripheral nerve gives rise to paresthesias, not pain, as evidenced by pressure on the ulnar or the tibial nerves. Macnab¹ reports a study of 12 patients with herniated discs in which, at the time of surgery, Fogarty catheters placed in the foramina of the involved nerve roots as well as in the foramina of normal roots, either above or below the level of pathology. Distention of the catheters postoperatively produced dysesthesias along the distribution of the "normal" roots while it produced sciatic pain in the roots previously compressed by a disc herniation. These observations suggest that nerve root pressure is not the sole cause of pain experienced in disc herniation and that in all probability there is some chemical mediation of pain.

In the early 1950's the concept that enzymes might transform the interior of discs into fibrous tissue was proposed. The feasibility of enzymatic therapy was summarized by Hirsch in 1959 and later by Mitchell. In 1963 Lyman Smith et al. injected chymopapain into discs of experimental animals and subsequently initiated a clinical trial in man.^{2,3} Their hypothesis was that enzymatic removal of the central contents of the disc would produce relief of symptoms.

Chymopapain is a proteolytic enzyme which is extracted from the fruit of the *Carica papaya*, a palm like tree. Its primary action on the central

contents of a disc is that of hydrolysis and dissolution of the non-collagenous protein which interconnects long-chain mucopolysaccharides. The initiating events in prolapse of a disc are felt to involve partial depolymerization of these long-chain mucopolysaccharides.⁴ One consideration is that nuclear chondromucoprotein depolymerizes slowly in the normal course of aging and erratically in the case of disc prolapse. Clinical healing is thought to occur when the chondromucoprotein is thoroughly degraded. Chymopapain rapidly converts these long-chain molecules into soluble metabolites (keratosulfate, chondroitin sulfate and protein), and relieves the discs of their undesirable effects, be they chemical, mechanical or whatever.⁵ (Macnab reported a series of 10 patients in which the appearance of myelographic defects was unchanged following clinically successful chemonucleolysis.) More complex modes of action have been postulated and the above comments are probably, at best, an oversimplification. Nevertheless, the central contents of the disc are converted into a dense rubbery mass and the disc is, in effect, "decompressed."

The introduction of the chymopapain into the disc is usually done under general anesthesia and under fluoroscopic control. A lateral approach to the disc through the paraspinal muscle masses with a six to eight inch spinal needle is recommended. The point of introduction is approximately 8.0 cm. lateral to the posterior spine and at about a 45° angle to the sagittal plane. Trans-thecal approach to the disc is avoided for reasons which will be discussed later, but the approach may be used if lateral introduction is technically impossible. Selection of the disc to be injected is based generally on the same criteria as for surgical excision: clinical localization, myelography, and discography. Myelography is done as an independent procedure. Discography is done at the time of the chemonucleolysis.⁶

Therapeutic results appear to parallel those of operative intervention with perhaps a slight edge afforded to the chemos. The most impressive benefits are obtained in those patients who would

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be considered as ideal candidates for laminectomy, i.e., those with relatively short history of severe sciatic pain, with evidence of marked unremitting root tension, with significant defect on myelography, and/or reproduction of clinically experienced pain on discography. As with surgery, benefits reach diminishing returns in patients with long standing disease, "complicated" disc herniation, spinal stenosis, poorly defined lesions and previous operative manipulation.

The action of the enzyme is immediate. Aspiration of the disc within minutes following an injection yields a cloudy precipitate consisting of the end products of the degraded substrate.⁷ Approximately one-third of the patients reportedly obtain dramatic relief of pain immediately following the injection. In the majority of those realizing symptomatic relief the leg pain subsides within 48 hours. The post-injection course is characterized by back pain and muscle spasms for a period of several days. Observers report the pain appears to be similar to that of a disc space infection. These symptoms are self-limiting and the patient is usually discharged from the hospital after an average stay of five to six days.

In 1969 Smith² reported the first 150 patients so treated with follow-up periods of six to 60 months. Eighty-three percent of this series had complete relief of backache and sciatica with no residual incapacity. Seven percent had incomplete relief of pain but no incapacity for work, and 10 percent had no improvement. These figures included patients treated who had had previous spinal surgery. Eighty-eight percent of the patients with virgin backs reportedly had complete relief. Physicians from various centers reported to the Academy symposium their experience with the drug in over 2500 cases. Their results were generally comparable to those reported by Smith but with some variations for the different type of problem treated. The presence of symptoms of long duration, symptoms consisting predominantly of back pain and of little or no sciatica, history of previous back surgery, obesity and emotional disturbances militated against a successful outcome.

Adverse reactions to the drug have been observed. The main hazard in its clinical use is that of anaphylactoid response. One death has been reported although it was not known for certain if it occurred in response to the enzyme or to contrast used in the discography. Lesser sensitive reactions have also been reported. The surgeon and the anesthesiologist in attendance must be alert to this possibility. (A history of sensitivity to Adolph's Meat Tenderizer is a contraindication to its use.)

Toxicologic studies of the drug have shown that in large doses it breaks down the cement bond between the endothelial cells of the capillaries giving rise to massive hemorrhage. The small vessels of the arachnoid are particularly susceptible to the action of chymopapain and if given intrathecally into experimental animals in low dose produces subarachnoid hemorrhage. It is for this reason that the posterior transthecal approach to the disc is avoided. Accidental intrathecal injection would be fraught with hazard. Epidural and intradiscal injections of the drug in doses up to 1,000 greater than the effective therapeutic dose are well tolerated in experimental animals.

The official status of chymopapain at the present time is that of an experimental drug, it can only be administered with a permit from the FDA. Apparently permits in addition to those already granted are not forthcoming. Proponents of the procedure are hopeful that the drug will be released for general use in the near future.

Chemonucleolysis is a major innovation in the surgical treatment of lumbar disc disease. The word "surgical" is purposely chosen to emphasize that this is not an alternative to accepted conservative management. The temptation of overutilization of the drug when released will be considerable. The present indications for its use are in patients who have failed to respond to conservative management and who are symptomatic to the degree that surgery is indicated. The procedure will not supplant laminectomy. Patients who fail to respond to the chemonucleolysis are generally considered as candidates for further definitive surgery.

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Oral Care in Radiation Therapy

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SEYMOUR H. LEVITT, M.D.‡

ABOUT 12 PERCENT of all cancers occur in the head and neck regions.¹ Treatment involves surgery, radiation, or a combination of surgery and radiation, and chemotherapy. Maintenance of acceptable oral health in patients receiving radiation is the subject of this paper.

Stafne reports three major oral problems which can be associated with concentrated doses of radiation to the facial area:² interference with normal development of the teeth and jaws, rampant caries, and osteoradionecrosis.² The mechanics which bring about these pathological changes are not well understood. However, many investigators feel that the basis is injury occurring at the single cell level.³

Radiation Therapy

The incidence of complications following radiation therapy appears to be decreasing due to modification of radiologic techniques and the use of supervoltage therapy.

Multiple and small portals for the radiation have been adapted.⁴ A technique of radiation administration delivering cancericidal doses of 5000 to 7000 rads to a tumor usually involves a daily dose of 150 to 200 rads four or five times per week.

The advantages that the supervoltage therapy has over the use of low and medium energy radiations are its bone sparing and tissue sparing effects. Some now believe that 1000 rads per week using megavoltage radiation will generally not cause any major complications if the total dose does not exceed 5000 rads.⁵ According to Erickson, however, the incidence of osteoradionecrosis increases in direct proportion to a radiation absorbed dose above 4000 rads.⁶

Oral Care Before Radiation

Before radiation therapy has begun, the patient

should be seen by a dentist if either the oral cavity or the salivary glands are part of the field. A careful oral examination should be carried out including roentgenographic examination, thorough soft tissue examination via palpation, examination of the teeth, and evaluation of the periodontium.¹ Calculus, plaque, and stains should be thoroughly removed. The patient should be instructed in the details of oral hygiene. A brushing technique must be taught that will be effective, consistent, and thorough. Many periodontists recommend one in which the brush is held into the marginal gingival area and a circular motion is used. A soft brush and non-abrasive toothpaste are recommended. Restorations should be of the highest quality with no sharp margins. A fixed prosthesis is preferred to a removable one.

Fluoride treatments to the teeth should be given daily during and following radiation (Figure 1). Fluoride application involves the use of individual plastic tooth covers constructed for each arch or the construction of custom made mouth guards. Before each application a 1% solution of viscous sodium fluoride is placed in the carrier and delivered to each arch for five minutes (Figure 2). After removal, the patient is instructed to not



Fig. 1—Intra-oral photo demonstrating good oral hygiene throughout radiation therapy of oral tissues.

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rinse for approximately half an hour. Daily applications can be done at home and should be carried out indefinitely. Whether teeth are present or not, warm oral lavage should be carried out during and after the period of radiation. One teaspoonful of baking soda and one-half teaspoonful of

salt are added to one quart of luke-warm water. The patient should be encouraged to use this oral rinse three to five times daily and more frequently if the mouth is dry.

A decision for removal of teeth should be based on extensive caries, periodontal involvement, lack of opposing teeth, partial impaction or incomplete eruption, periapical lesions, and oral hygiene status of the patient.⁸ Endodontics may be employed to retain specific teeth for esthetic or prosthetic needs. Some clinicians use the guideline that any tooth that may have to be removed during the subsequent 12 month period should be extracted prior to radiation. Carious or periodontally involved teeth directly in the line of radiation should be extracted. Alveolectomies should be performed when indicated, and sufficient bone may have to be removed to permit a careful soft tissue closure which will avoid delayed healing. As the irradiated bone is slow to remodel, meticulous surgery is necessary. Tori should be left unless they are sharp or their removal is indicated for prosthetic reasons. Particular attention should be given to the mylohyoid ridge area. Deeply impacted teeth covered by bone and soft tissue may be left as the bone will not resorb if it is irradiated and a postoperative osteitis may delay the initiation of the radiation therapy. Partially erupted teeth should be extracted.¹ Antibiotic coverage should be instituted prior to any contemplated surgery and continued through the primary healing phase (10-12 days).

The timing of radiation therapy following oral surgery is controversial. An interval of 10-14 days is usually adequate. The most important consideration is that the surface coverage of any exposed bone be complete before radiation starts.

Oral Care Following Radiation

Once the teeth have been exposed to radiation, all dental care thereafter should be conservative. Endodontics should be considered in lieu of extraction. Splinting may be useful in cases of mobility. If extraction is unavoidable, conservative surgical technique is mandatory and antibiotic coverage is indicated. Mandibular extraction sites are more vulnerable to postoperative complications.

Edentulous patients should not be considered for complete dentures for about one year following radiation therapy. Some patients may never wear a prosthesis. This is related to the severity

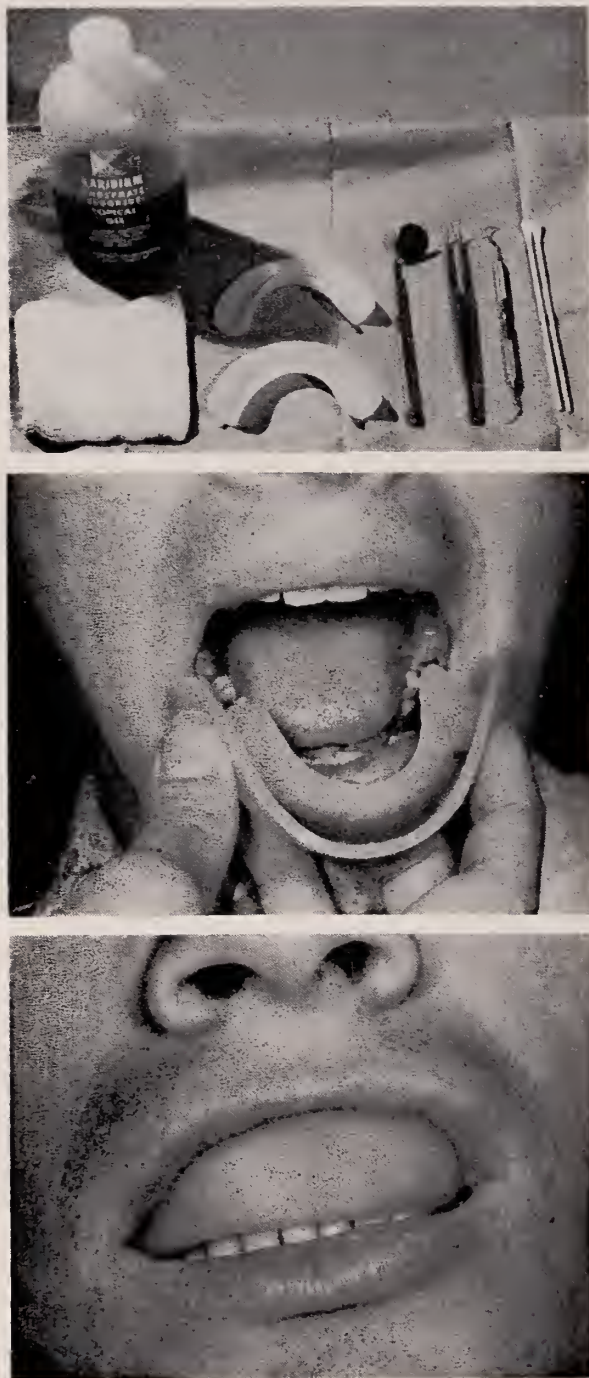


Fig. 2—An application of a 1% solution of sodium fluoride for five minutes is delivered by custom made mouth guards or individual plastic tooth covers. (A-top) Equipment for application of sodium fluoride; (B-middle) Tray ready to be seated; (C-bottom) Tray seated.

of radiation complication, jaw relationship, patient co-operation, etc. The alveolar ridges must be examined for smoothness and some return of salivary function should be present before a prosthesis is considered. The prosthesis itself should be constructed in such a way as to minimize ridge stresses. At the first sign of discomfort, the denture should be removed.

Complications and Their Treatment

Despite careful management, several complications can occur during and after the radiation period.

Caries

Caries is a definite postirradiation problem (Figure 3). Caries may be a direct effect of irradiation of the teeth,¹¹ or secondary to xerostomia.^{12,13} Frank related caries to the xerostomia and pointed out that patients did not have a massive destruction of tooth surfaces unless the salivary glands were included in the field.¹³ He also noted a reduction of pH of saliva when the glands were irradiated. The most important considerations in predicting caries activity in the patient receiving radiation to the oral cavity are: (1) original caries susceptibility, (2) gingival recession, (3) oral hygiene and, (4) dietary alterations during the irradiation period.

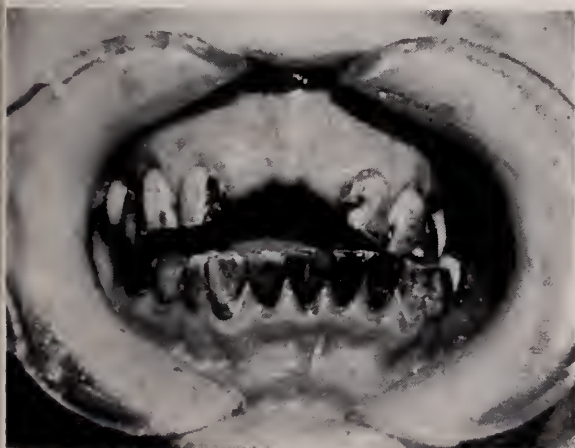


Fig. 3—Intra-oral photo demonstrating staining, plaque accumulation, and a definite post-irradiation problem.

Mucositis

Reddening of the oral mucosa or mucositis, and skin erythema are the first clinical signs following irradiation. Mucositis is a condition wherein the basal cell layer of the mucous membrane dies due to the radiation and produces a wide shallow ulceration.¹ It is not preventable and may be considered a necessary biological concomitant reac-

tion of radiation on a rapidly proliferating cell population. Mucositis is usually seen after a dose of about 2500 rads.⁹ The severity of the reaction is related to the total dose of radiation received, time period over which the radiation was given, volume and type of tissue irradiated, and modality used. Severe mucositis clinically has the appearance of white patches on an erythematous background¹ (Figure 4).

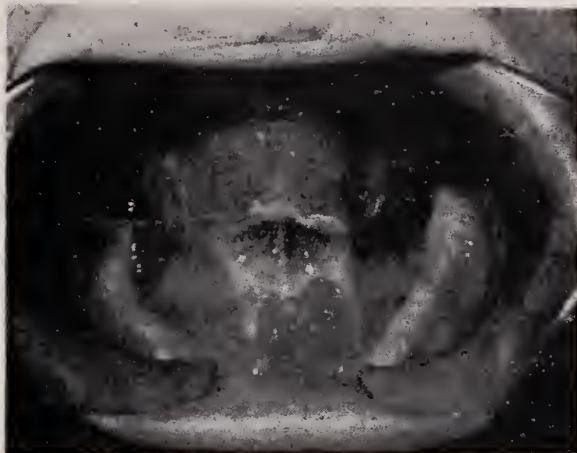


Fig. 4—Mucositis is seen clinically as white patches on an erythematous background.

Treatment of mucositis is symptomatic. Warm saline oral lavage will help keep the exposed sub-mucosa comfortable and clean. A soft diet, frequent fluid intake, and application of a topical anesthetic such as viscous xylocaine may be indicated.¹ A warm solution of one teaspoonful of Karo syrup and tap water is also soothing to the tissues, but has the disadvantage of the sugar contributing to caries.

Xerostomia

Xerostomia frequently develops during and after irradiation if the major salivary glands are included in the field. The role of the salivary glands in the production of this complication is not generally agreed upon. Initial changes in the parotid gland include destruction of the few mucous cells present followed by edema and parenchymatous degeneration of the serous acini.¹³ In the submandibular, lingual and minor salivary glands there is also a destruction of the mucinengorged cells with an immediate release of mucin. Continued irradiation brings about a complete or partial loss of mucin resulting in a scant, thin, and watery saliva. This absence of oral lubrication from mucin and a decrease in total saliva output are responsible for the xerostomia. Clinically, the intensity of the dryness increases with

tissue contact, spicy foods, fruits, alcohol, tobacco, carbonated beverages, and irritations.¹ A humidifier should be placed in the room and frequent intraoral fluids should be encouraged. Relief will also be obtained from substances which increase the lubrication of the oral tissues such as physiologic saline, mineral oil, or glycerine. Salivary flow may be stimulated by sugar free lemon drops. The duration of this condition is highly variable and is related to the dose and field of radiation.

Osteoradionecrosis

Osteoradionecrosis has been described as "a chronic unrelenting osteomyelitis of bone which has sustained radiation injury resulting in its inability to defend and repair itself."⁹ It was first reported in the United States in 1924 as associated with radium poisoning in watch dial painters.¹⁴

Bone damage following irradiation is the result of injury to the bone cells and vascular components. The exact pathologic process, however, is poorly understood.¹⁵ Generally, decreased osteoblastic and osteoclastic activities give rise to a diminished vitality in the affected areas. The bone forming and protective function of the periosteum is destroyed.¹⁶ Vascular damage may occur as a result of an obliterative endarteritis secondary to the radiation therapy.¹⁷

Anatomically, the blood supply to the mandible makes it more susceptible to osteoradionecrosis than the maxilla. Also the mandible has a larger percentage of compact bone and is more often in the line of radiation.

The incidence of osteoradionecrosis appears to have decreased since the introduction of super-voltage techniques. Watson and Scarborough reported in 1938 an incidence of 13% of 1,819 cases studied.¹⁸ Silverman in 1964, however, reported an incidence of only 3%.¹⁹ It is now believed that 2% or less of those patients receiving radiation where the mandible is in the field develop subsequent osteoradionecrosis.¹ The time of onset is highly variable. Cases have been reported as early as five months and as late as twelve years post-irradiation.^{11,18} The need for periodic recall of post-irradiation patients over an extended period of time is evident.

The early diagnosis of osteoradionecrosis is often difficult. The initial symptom is pain. Examination at this time may reveal an area of denuded, non-vital bone (Figure 5). Radio-

graphic diagnosis is unreliable. Stafne has stated that osteoradionecrosis cannot be differentiated from osteomyelitis of pyogenic origin.² The first radiographic evidence often occurs late in the disease process and may manifest as radiographic density is increased followed by evidence of osteolytic centers, pathologic fracture, and eventually sequestration² (Figure 6).



Fig. 5—Intra-oral photo of an area of denuded bone, a post-irradiation complication.

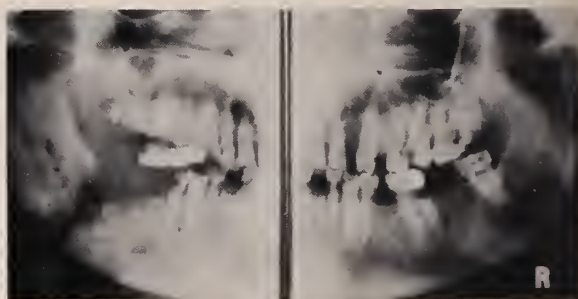


Fig. 6—Panoramic radiograph demonstrating the pathologic changes in osteoradionecrosis. On the left, osteolytic centers, pathologic fractures and sequestration of bone are evident.

Treatment of these lesions is also difficult. Small necrotic areas are best managed conservatively. Antibiotics may prevent an enlargement of the necrotic area and minimize secondary infection. Penicillin is probably the drug of choice. Since the healing of these lesions is very slow, antibiotic protection may be continued for weeks or months. Locally, peroxide glycerine preparations (Gly-Oxide) over the soft tissue ulceration will aid in keeping the area clean. This should be applied by the patient about four times daily. Curettage of small lesions is usually not indicated as the normal closure often breaks down and more radical procedures may then be necessary.

Infection

There is an increased incidence of oral infection related to those tissues receiving radiation. Some factors responsible for this increase include local erosion, necrosis associated with carcinoma or radiation, leukopenia associated with extensive radiation, poor diet and general debilitation.¹ Increased desquamation of the mucosa permits easy entry of oral bacteria.

Oral moniliasis is seen frequently. It is accompanied by symptoms of burning, tenderness, and dryness. Its appearance varies from that of a non-specific stomatitis to greyish-white necrotic patches. A culture is a helpful diagnostic aid. Treatment consists of mouth rinses after each meal and before retiring with mycostatin suspension or ointment (2 ml or 200,000 units).

Other local infection should be treated promptly. Any soft tissue ulceration over heavily irradiated bone can lead to osteoradionecrosis. Numerous topical anti-infectives are available including tetracycline, neomycin, polymyxin B, glyoxylate, and gentian violet. Any recurrent ulceration should

arouse suspicion and biopsy should be done to exclude recurrence of tumor, although biopsies of irradiated tissues may be unreliable.

General Care

The maintenance of the highest level of oral hygiene is essential. Adequate nutrition, often a major problem, must be maintained. Abstinence from tobacco and alcohol is important. However, compromises may sometimes be necessary.

Summary

Patients receiving radiation therapy involving the oral cavity and contiguous structures require specialized and individualized care under a team of experienced clinicians. The oral health problems of these patients are reviewed. The preparation of the oral cavity for radiation includes the removal of gross sepsis, extraction of questionable teeth, and patient education. During the radiation period the use of fluoride treatments, establishment of good oral health regimens including lavage and brushing, and maintenance of good nutrition are necessary.

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"Independence Day"

The cover photograph of the night-time firework display at the Lafayette Club on Lake Minnetonka on the Fourth of July was taken by Dr. David J. Dunlap. He is an urologist, practicing in Minneapolis and on the medical staffs of North Memorial, St. Mary's and Unity Hospitals.

Every year at the Lafayette Club there is a fire display on the Fourth and people gather in their boats on the Lake in front of the Club observing the display. Dr. Dunlap told the editors he was at Bohn's Point directly across from the Club and used a time exposure to take the cover photo.

Acute Suppurative Thyroiditis

Report of Two Cases Including One Caused by *Mycobacterium Intracellulare* (Battey Bacillus)

RONALD OLIN, M.D.,* WAYNE E. LeBIEN, M.D.,* AND JOHN E. LEIGH, M.D.*

ACUTE SUPPURATIVE thyroiditis is a rare disease often difficult to diagnose in its early stages. It is much less common than subacute (DeQuervain's) and chronic (Hashimoto's and Riedel's) thyroiditis. Hamburger¹ in ten years of practice devoted to thyroid diseases, encountered only three patients with acute suppurative thyroiditis.

Suppurative thyroiditis was much more prevalent in the era before the liberal use of antibiotics. Boothby & Plummer² reported 24 cases occurring between 1910 and 1932. Young³ in 1940 found 26 cases of acute thyroiditis in 2900 thyroidectomies of which four were thyroid abscesses. In 1950, Altemeier⁴ reported ten cases of acute pyogenic thyroiditis. Hendrick⁵ in 1956 noted 28 cases of acute thyroiditis in 1309 thyroidectomies of which six were abscesses.

We have recently had the opportunity of seeing two patients with acute suppurative thyroiditis with abscess, including the case of a child from rural Minnesota in which *Mycobacterium intracellulare* was cultured. To our knowledge, this organism has not previously been reported to be associated with acute suppurative thyroiditis.

Case Reports

Case 1

A four-year old white girl who lived on a farm on the Minnesota side of the Minnesota-North Dakota border was seen in March, 1972, because of a painful, swollen thyroid gland which had come on suddenly one month previously. There was no history of a preceding upper respiratory infection. She had been afebrile from the onset and not ill otherwise. Tetracyclines, erythromycin, thyroid hormone and steroids had been given as one to two week trials of therapy but without benefit.

Physical examination revealed that the thyroid gland was diffusely replaced by a large, soft fluctuant mass larger on the left side. There was a firm, right supraclavicular node and shotty, bilateral, posterior triangular nodes.

Laboratory tests revealed the following: hemoglobin 12.6 gm.%; leukocyte count 9,800 per cmm. with a normal differential; sedimentation rate 47 mm. per hour (Westergren); normal or negative urinalysis, serum total thyroxine, T3 test and antithyroglobulin and antithyroid microsomal antibody titers. The I-131 uptake in 24 hours was 8% (normal 14 to 35%). Thyroid scan revealed "cold" areas. Chest Xray was negative; Xray of the cervical spine revealed soft tissue swelling in the anterior neck. A PPD intermediate skin test showed 1 x 1.2 cm. of erythema and 0.5 x 0.4 cm. of edema.

Three cc's of greenish, cloudy pus was aspirated from the left lobe area of the thyroid and sent for culture. The following day, under general anesthesia, the thyroid gland was entered through a transverse incision. There were three large abscess cavities all within the thyroid capsule. All cavities were widely opened and irrigated with peroxide and Betadine; two penrose drains were also inserted. The postoperative course was uneventful and she was dismissed without medication.

Cultures grew out *Mycobacterium intracellulare* (Battey bacillus) sensitive to INH, PAS and Streptomycin. It was then determined that the farm contained some poultry but no swine or cattle. None of the poultry had been ill. The child often helped pick eggs.

When seen for follow-up four months later she was feeling well. A small amount of pus was drained by unroofing a small ulcer in the incision and cauterizing it. The right supraclavicular node was smaller. Chest Xray remained negative; PPD intermediate skin test was still positive; the serum total thyroxine was again normal. INH was started.

Case 2

An 18-year old white man was hospitalized in April, 1969, because of pain, swelling, and tenderness of the left lobe of the thyroid gland of five days' duration. There was difficulty swallowing and he had been living on liquids for the previous two days. There was no preceding upper respiratory infection. Two years previously he had noted some swelling in the region of the left lobe of the thyroid gland which soon subsided without medical care.

Physical examination revealed a temperature of 102°F. The left lobe of the thyroid gland was enlarged three-fold, tender and fluctuant. The right lobe was normal size but tender. There was no cervical adenopathy.

Laboratory tests revealed the following: hemoglobin 15.1 gm.%; leukocyte count 8,600 per cmm. with 81% segs.; sedimentation rate 35 mm. per hour (Westergren);

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See editorial, page 619.

normal urinalysis, serum PBI, total thyroxin and cholesterol. Chest Xray was negative. The I-131 uptake in 24 hours was 6% (normal 14 to 35%). Thyroid scan revealed a "cold" left lobe and irregular uptake on the right.

Five ml of purulent material was aspirated from the left lobe under local anesthesia. The patient then became afebrile and the thyroid gland returned to normal size. Cultures grew out *Staphylococcus epidermidis*, coagulase negative and *Streptococcus anhemolyticus*. Treatment consisted of Ampicillin 500 mg. orally every six hours for 10 days and desiccated thyroid hormone, two grains daily for two months.

Shortly after leaving the hospital, he saw his dentist who extracted one abscessed tooth, thus perhaps implicating the mouth in the pathogenesis of the thyroid abscess.

When seen for final follow-up six months later, he was feeling well and taking no medications. The thyroid gland was nontender and the outline of the left lobe was indistinct.

Discussion

Pathogenesis

Normally the thyroid gland has a remarkable degree of resistance to infection. It is completely encapsulated and thus not in direct communication with neighboring structures. It has an extensive lymphatic drainage and blood supply. The relatively high iodine concentration also provides an unfavorable environment for bacterial growth. Womack and Cole⁶ injected live staphylococcal and streptococcal organisms directly into the superior thyroidal artery of dogs and noted that even this rarely caused local suppuration.

Suppurative thyroiditis is invariably a secondary or metastatic phenomenon with the primary foci usually in the upper respiratory tract, face, mouth, and cervical nodes. The infection spreads to the thyroid via the lymphatics or blood stream. The fact that the arterioles of the thyroid are end arteries may favor implantation of septic emboli. Other methods of infection are by direct extension, sharp trauma to the anterior neck injuring the capsule, and rarely via a patent thyroglossal duct. Occasionally thyroid suppuration can occur in drug addicts who inject directly into the jugular vein.

The commonest organisms responsible for thyroid suppuration are the Gram positive cocci, namely, streptococci, staphylococci and pneumococci. *Mycobacterium tuberculosis*,⁷ *Treponema pallidum*,⁸ typhoid and paratyphoid bacilli,⁹ *Clostridial sp.*,¹⁰ *Actinomyces sp.*,¹¹ *Bacteroides*,¹² *E. coli* and Trypanosomes may cause suppuration in rare instances.

Suppurative thyroiditis may occur in a normal gland but is more common in a pre-existing goiter with one or more adenomas.

Clinical Manifestations

Women are more susceptible to thyroid suppuration than men in a ratio of 2:1. The most common age group is young adults, between 20 and 40 years of age. Patients present with the sudden onset of a painful, tender swelling in the anterior neck. Fever, chills, malaise, and dysphagia are common. The dysphagia is frequently referred to the ears, mandible, and occipital region. The patient may complain only of a sore throat and hoarseness. Physical examination reveals a localized or diffusely swollen and tender thyroid gland. The skin overlying the gland is often red and warm. The head is often held in the characteristic position described by Lahey in 1917 with the chin flexed to the involved side due to spasm of the neck muscles and in order to swallow. The swelling is at first firm, then fluctuant. Regional nodes may be involved. Occasionally, the neck is edematous so that the extent of the disease cannot be determined. The infection may subside spontaneously or proceed to abscess formation and spread in any direction. The danger is extension into the deep spaces of the neck with rupture into the mediastinum, trachea or esophagus. The prognosis is good as to life and adequacy of thyroid function.

Laboratory Tests

A polymorphonuclear leukocytosis and an elevated sedimentation rate are common. Patients are usually euthyroid in the acute phase. A thyroid scan can help in the differential diagnosis especially in separating suppurative adenitis; the area of thyroid suppuration is usually localized and functionless. The 24 hour I-131 uptake is commonly decreased. A discrepancy may exist between PBI and BEI values.¹⁴ With thyroidnecrosis, iodine-containing products spill into the blood and are measured in the PBI determination but not in the BEI.

Differential Diagnosis

Subacute thyroiditis is usually a milder disease and more often diffuse than localized. Serum thyroxine is likely to be elevated at the same time as the I-131 uptake is depressed. The differentiation from suppurative thyroiditis may be difficult in severe cases. Suppurative adenitis is also a less severe illness with the lesion more lateral and smaller. The thyroid scan is normal if the infection

has not reached the point of thyroid abscess formation. Hashimoto's thyroiditis has a gradual onset and the goiter is usually symmetrical and seldom large or very tender. Hemorrhage into a thyroid adenoma or cyst causes a painful, tender goiter but there is usually no fever or leukocytosis. Anaplastic carcinoma of the thyroid with tissue necrosis can be difficult to differentiate without histopathologic studies. If doubt exists about the diagnosis of acute suppurative thyroiditis, needle aspiration should be done.

Treatment

Treatment of suppurative thyroiditis consists of a combination of incision and drainage and appropriate antibiotics implemented early. The abscess is drained through a collar incision followed by a longitudinal incision through the prethyroidal muscles to the abscess cavity. Hendrick advised considerable care not to break down the walls of the abscess which could cause fatal mediastinitis. If multiple, loculated abscesses cannot be drained, partial or total thyroidectomy may be necessary.

Mycobacterium Intracellulare

Runyon Group III of atypical mycobacteria is made up of a heterogeneous variety of both pathogenic and nonpathogenic mycobacteria which do not develop pigment on exposure to light (non-photochromogens). Five subgroups are recognized of which *Mycobacterium intracellulare* is the best known. Synonyms are Battey-avian-swine complex, *M. avium* and Battey bacillus. This organism was first isolated at the Battey State Hospital, Georgia and is responsible for a pulmonary disease similar to that caused by *M. tuberculosis* and *M. Kansasii* although not occurring as frequently.¹⁶ Less commonly it can cause lymphadenitis, septic arthritis, tendinitis, skin lesions and fatal disseminated disease. Although infection with nonphotochromogens is said to occur most commonly in the southeastern part of the United States, some of the first reported cases involved patients who lived in Minnesota.¹⁷ Patients usually give a history of exposure to poultry, swine, or cattle. The best therapeutic results are obtained by surgical treatment. Chemotherapy seems to be of little avail.

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In vaine of me ye hope for remedie,
 And I likewise in vaine doe salues to you applie.
 For in your selfe your onely helpe doth lie,
 To heale your selues, and must proceed alone
 From your owne will, to cure your maladie.
 Who can him cure, that will be cur'd of none?*

*Edmund Spenser, *The Faerie Queene*, Book VI, Canto VI, stanzas 6-7 (1596)

Diagnostic Applications of Antinuclear Antibodies

Specifics and Non-Specifics

ABE L. FOX, JR., M.D.*

ANTINUCLEAR ANTIBODY detection has added both significant positive information and confusion to the differential diagnosis of clinical disease. There are several reasons for this.

1. Some antinuclear antibodies occur as a natural autoimmune phenomenon, unrelated to clinical disease. (Benign autoimmune phenomenon)
2. Some antinuclear antibodies are related directly to autoimmune diseases, and sometimes participate directly in the autoimmune disease process in the form of antigen-antibody complexes. (Disease-associative)
3. Other antinuclear antibodies occur incidental to autoimmune diseases. The antibodies have no direct or casual relationship to the disease process; their occurrence is incidental. (Incidental, non-associative)

These situations are partly separable by species identification of the antibody with specific nuclear proteins. Antibodies to the following nuclear antigens have been identified in association with clinical disease:

- "Native" DNA (double stranded)
- Denatured DNA (single stranded)
- DNA-histone (DNP)
- ENA (extractable nuclear antigen)
- Phosphate extractable antigens (Sm and others)
- Nucleolar

"Specific" Antinuclear Antibodies

Only *anti-"Native" DNA* has a high degree of specificity for the disease Systemic Lupus Erythematosus (S.L.E.). *Anti-"Native" DNA* antibodies are infrequent with other clinical diseases. Naturally occurring *anti-"Native" DNA* (benign autoimmune phenomenon) is apparently rare.^{4,6,9}

In contrast, *anti-Denatured DNA* antibodies are relatively common autoimmune phenomena and

occur frequently in association with drug induced Lupus syndromes, Chronic Active Aggressive Hepatitis, Rheumatoid Arthritis and less frequently with other collagen-vascular diseases. *Anti-Denatured DNA* antibodies are also common in S.L.E.⁴ Approximately 30% of patients with Systemic Lupus Erythematosus have antibodies to denatured DNA and no detectable *anti-"Native" DNA* antibodies.

"Speckled" fluorescent patterns of antinuclear antibody reaction and *anti-Nucleolar antibodies* are common in individuals with Progressive Systemic Sclerosis ("Scleroderma"). The former antibody is not *anti-Sm*.¹

ENA antibodies are prevalent in the "Mixed Connective Tissue Disease" syndrome and are also frequently found in S.L.E. The S.L.E. *anti-ENA* antibody-nucleoprotein reaction is RNA'se resistant; the Mixed Connective Tissue disease associated antibody reactions are RNA'se sensitive.⁷

L.E. Cell Preparation

The L.E. cell preparation is a complement dependent reaction detecting antibody to *DNA-histone (DNP)*. The L.E. cell prep is frequently positive in patients with S.L.E., drug induced Lupus syndromes, Rheumatoid Arthritis and other diseases. It is *not* specific for Systemic Lupus Erythematosus.⁵

Antinuclear Antibody Titers

The clinical significance of antinuclear antibodies is also closely correlated with the titer or concentration of the antibody in the serum. The absolute values of these "titers" varies considerably with the method employed to demonstrate the antibody (immunofluorescence microscopy, immunofluorescence macroscopic spot tests, precipitin tests, hemagglutination, radio-immunoassay), but it is valuable to consider "low" and "high" titers of antibody as they relate directly to the clinical

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See editorial, page 622.

significance of the antibody and disease activity.

"High" titer antibodies are usually significant and indicate disease activity; "low" titers indicate decreased disease activity (e.g. treatment remission) or incidental phenomena.

Autoimmune Phenomena and Autoimmune Disease

"Naturally" occurring, disease associative, and incidental antibody phenomena are separable by combining clinical information, antibody species identification, antibody titer and other useful laboratory tests. A brief summary of these antinuclear antibody phenomena and disease follows. Included in Table 1 are serum complement, Rheumatoid Factor, and L.E. cell prep test results expected.

Antinuclear Antibodies Occurring as a Benign Autoimmune Phenomenon

Elderly Patient

Low serum concentrations of antinuclear antibodies are relatively common in elderly patients without disease. This phenomenon appears to be a result of aging only and is of no clinical significance.

Other

Younger individuals infrequently have "naturally" occurring antinuclear antibodies. The frequency of this serologic abnormality is difficult to determine statistically, or to interpret for the in-

dividual patient. Some of these patients may have latent or occult disease. Further laboratory and clinical evaluation is indicated.

Autoimmune Disease; Antinuclear Antibody Associative

Systemic Lupus Erythematosus

Antibodies to DNA are an integral part of Systemic Lupus Erythematosus. Immune complexes of anti-DNA and DNA are causally related to Lupus Nephritis.

Serum levels of anti-DNA vary with disease activity and treatment. Serum complement levels fall with the development of "soluble" (moderate DNA excess) immune complexes which bind complement. Hypocomplementemia is most common in patients with nephritis. Vasculitis with hypocomplementemia and no renal disease is less frequent. Specifically, anti-"Native" DNA antibodies are prevalent. Denatured DNA, DNA-histone, S_n and ENA antibodies are frequent but not specific.

Drug Induced Lupus Syndromes

Drug induced Lupus syndromes are associated with the development of antibodies to Denatured DNA.² While many of the clinical parameters typical of idiopathic Systemic Lupus Erythematosus are duplicated, nephritis is unreported and serum complement levels are uniformly normal. These findings imply that complement binding "soluble" DNA-anti-DNA complexes are not produced in significant quantities in drug induced

TABLE 1
Antinuclear Antibodies (A.N.A.)—Autoimmune Diseases

	Serum Complement	Rheumatoid Factor	L.E. Prep
A. Benign Autoimmune Phenomenon; NATURALLY OCCURRING A.N.A.			
1. Elderly patient—common			
2. Other . . . indeterminate small % of normals may have occult or latent autoimmune disease LOW TITER ANTIBODY—NO CLINICAL DISEASE	Normal	Negative	Negative
B. Autoimmune Disease; A.N.A. ASSOCIATIVE			
1. Systemic Lupus Erythematosus HIGH-TITER ANTIBODY to NATIVE DNA (most specific) Antibody to Denatured DNA—frequent Antibody to Nucleo-histone—frequent	Frequently decreased	Usually negative	Frequently positive
2. Drug induced Lupus Syndromes HIGH-TITER ANTIBODY to DENATURED DNA Antibody to Nucleo-histone—frequent	Normal	Frequently positive	Frequently positive
3. Mixed Connective Tissue Disease Syndrome HIGH-TITER ANTIBODY to ENA (RNA'se sensitive)	Normal to increased	Usually negative	Variable
C. Autoimmune Disease; A.N.A. "INCIDENTAL" Rheumatoid Arthritis Chronic Active Aggressive Hepatitis ("Lupoid") Progressive Systemic Sclerosis (Scleroderma) Other Collagen-vascular diseases Thyroiditis VARIABLE TITER ANTIBODY TO DENATURED DNA, OTHER NUCLEAR ANTIGENS	Normal to increased	Frequently positive	Variable

*Fluctuates with disease activity or treatment.

Lupus syndromes.

Anti-IGG antibodies (Rheumatoid factors) are also relatively frequent with drug induced Lupus syndromes. Both anti-DNA and anti-IGG antibodies disappear from the serum after the drug is stopped. Symptoms and antibodies may persist for variable periods of time but eventually dissipate.

Mixed Connective Tissue Disease Syndrome

This disease process is a complex of the clinical manifestations of S.L.E., Polymyositis and Progressive Systemic Sclerosis. The prevalent antibody identified is anti-ENA (RNA'se sensitive extractable nuclear antigen). Anti-DNA antibodies are also found. Nephritis and hypocomplementemia are unreported to date.⁷

Autoimmune Disease; Antinuclear Antibodies Incidental, Non-Associative

The extent to which "disease associative" antinuclear antibodies participate directly in S.L.E., drug induced Lupus syndrome, and the Mixed Connective Tissue Disease syndrome is not always measurable. However, it is clear that antinuclear antibodies in the following diseases occur as *incidental phenomena*. The diseases are not a result of antinuclear antibodies; the presence of antinuclear antibodies does not indicate some "variety" of Lupus. The antibodies produced are incidental, not associative.

Rheumatoid Arthritis

Anti-IGG antibodies (Rheumatoid Factors) are prevalent in Rheumatoid Arthritis but incidental antinuclear antibodies (anti-Denatured DNA) are also relatively common. In younger age groups (Juvenile Rheumatoid Arthritis) antinuclear antibodies are more common than Rheumatoid Factors. Serum complement levels are normal or increased in uncomplicated cases. L.E. cell preparations may be positive.

Chronic Active Aggressive Hepatitis

When chronic active aggressive hepatitis is accompanied by the serologic abnormality of antinuclear antibodies, it has been referred to as "Lupoid." The disease process is unrelated to Systemic Lupus Erythematosus and the term is unfortunate. Liver disease is unusual with S.L.E. and, when present, is rarely of the chronic active aggressive type.

The antinuclear antibodies produced are variable. Anti-Denatured DNA and DNA-histone antibodies (positive L.E. prep) are common. Serum complement is normal or high. Clinical

evidence of joint or renal disease is negligible. *Progressive Systemic Sclerosis (P.S.S.)*

Antinuclear antibodies with "speckled" nuclear patterns of reaction (not Sm) are common in patients with P.S.S. ("Scleroderma"). Nucleolar antibodies are less frequent, but are more specific. Anti-DNA and/or anti-DNP antibodies are relatively uncommon. The malignant hypertension renal lesion of P.S.S. is not associated with hypocomplementemia. The significance of antinuclear antibodies in this disease is unclear.

Polyarteritis, Dermatomyositis, Polymyositis, Autoimmune Thyroiditis.

Antinuclear antibodies may have some importance in the evolution of these diseases but the incidence of measurable antinuclear antibodies is low and probably insignificant.

Differential Anti-DNA Testing

The value of differential testing for anti-"Native" and anti-Denatured DNA antibodies is apparent. Detection of anti-"Native" DNA antibodies is positive presumptive evidence for Systemic Lupus Erythematosus. Anti-Denatured DNA antibodies occur in many disease processes, including S.L.E. Identification of Anti-Denatured DNA antinuclear antibody in a patient's serum should increase clinical suspicion of S.L.E., but is not specific.

We have recently devised a modification of the Friou immunofluorescent spot test³ for differentiating antibodies to "Native" and Denatured DNA. Serial dilutions of the patient's serum are incubated with equal aliquots of "Native" and heat denatured calf thymus DNA (Worthington Biochem).

The antibody species and clinical diagnosis of M.H. inpatients tested March 1-November 1, 1972 are paired in the tables. Of 310 in patients screened, 65 patients had antibodies to DNA; eight of these 65 had anti-"Native" DNA antibodies; 57 had anti-Denatured DNA antibodies. Fifty-five of the 65 patients were females (see Table 2).

TABLE 2
Methodist Hospital Antinuclear Antibody Screens
March 1-Nov. 1, 1972

Total Inpatients Tested	310
Anti-"Native" DNA	8 (8F.)
Anti-Denatured DNA	57 (47F.)

Seven of eight patients with anti-"Native" DNA antibodies were diagnosed clinically as Systemic Lupus Erythematosus. Only four of 57 patients with anti-denatured DNA antibodies had clinical manifestations of S.L.E. (see Table 3).

TABLE 3
Methodist Hospital Patients—Anti-DNA Antibodies
March 1-Nov. 1, 1972

Anti-"Native" DNA	8
Clinical DX SLE	7
"Other"	1
Anti-Denatured DNA	57
Clinical DX SLE	4
"Other"	54

Nineteen patients were 60 or over. Two of the 19 had high titer antibodies to denatured DNA. Of the two "elderly" patients with high titer anti-Denatured DNA antibodies, one had Systemic Lupus Erythematosus, the other Rheumatoid Arthritis. Seventeen of the 19 elderly patients had no clinical evidence of autoimmune disease (see Table 4).

TABLE 4
Methodist Hospital Patients—Anti-Denatured DNA
March 1-Nov. 1, 1972

Clinical Diagnosis		(High titer)
SLE	4	(2)
Rheumatoid Arthritis	8	(3)
P.S.S.	1	
Drug Induced Lupus Syndrome	2	(1)
Auto Immune Hepatitis	1	
Lung Disease	4	
Other (includes sarcoidosis, malignancies, infection, FUO, misc.)	20	(None)
Elderly patients (60+)	19	(1-S.L.E.; 1-R.A.)

The most common clinical disease of patients with anti-Denatured DNA antibodies was Rheumatoid Arthritis (8/57). Systemic Lupus Erythematosus, drug induced Lupus syndrome, autoimmune liver disease and other diseases were present in this group.

Though the number of patients is relatively small, the selective specificity of identifying anti-"Native" DNA antibodies is evident. Of the eight patients with anti-"Native" DNA, only one was not clinically diagnosed as S.L.E. In retrospect, this patient has many of the clinical features of S.L.E. and may manifest this disease, or some other, more clearly in the future.

Less than 10% of the patients with anti-Denatured DNA antibodies had Systemic Lupus Erythematosus (4/57). The vast majority of these patients had other autoimmune processes or "benign" phenomenon, not S.L.E.

Friou reviewed several authors' anti-"Native" DNA antibody test results and found 28 of 4,859 patients with non Lupus autoimmune disease were reported to have low titer anti-"Native" DNA antibodies, an incidence of less than 1%. Thirteen of

these patients had Rheumatoid Arthritis and several had Sjogrens syndrome. Single cases of Polyarteritis Nodosa, chronic active hepatitis, multiple myeloma and "chronic glomerulonephritis" were also reported.⁶

Summary

1. Low titer antinuclear antibodies occurring in elderly patients are usually insignificant. In the absence of clinical disease, low titer antinuclear antibodies should be interpreted as a naturally occurring "benign" autoimmune phenomenon in this population.
2. Low and high titer antinuclear antibodies in other than elderly patients are usually *not* naturally occurring immune phenomena. These patients should be evaluated carefully for possible autoimmune disease or drug history.
3. Anti-"Native" DNA antibodies are most common in patients with Systemic Lupus Erythematosus. However, some patients with S.L.E. have antibodies to denatured DNA only.
4. Anti-Denatured DNA antibodies are frequent in autoimmune diseases other than S.L.E.:
 - a. In some instances the association with the disease process is relatively constant and probably directly related. (Drug induced Lupus syndrome)
 - b. In some instances the anti-nuclear antibodies appear to occur as an incidental phenomenon, without constant or direct association with the disease process. (Chronic Active Aggressive Hepatitis. Rheumatoid Arthritis etc.)
5. Antinuclear antibody *titers* generally correlate with disease activity. High titer anti-nuclear antibodies do not indicate Systemic Lupus Erythematosus unless the antibody specificity is anti-"Native" DNA. Low titer anti-nuclear antibodies may reflect disease remission (e.g. treatment) or incidental phenomena.
6. Results of a differential anti-"Native" and anti-Denatured antibody test are reported. A high degree of correlation between anti-"Native" DNA antibody and the clinical diagnosis of S.L.E. was found. Less than 10% of patients with anti-Denatured DNA antibodies had S.L.E.

Acknowledgments

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Reference 1-10 are shown on page 596.

Treatment of Testicular Tumors

ELWIN E. FRALEY, M.D., COLIN MARKLAND, M.D. AND KAILASH KEDIA, M.D.

NEOPLASMS OF THE testicle are classified according to their probable cell of origin; that is, germinal and non-germinal cell tumors. Germinal tumors are the most common testicular tumors in adults. The four main histologic types of germinal neoplasms are seminoma, teratocarcinoma, embryonal carcinoma, and choriocarcinoma.

Even though germinal tumors may have a common origin, they are usually subdivided clinically on the basis of their malignant potential and their response to treatment. For example, seminomas are extremely radio-sensitive and, therefore, treatment is orchidectomy and radiation, even with metastatic disease. The cure rate of these tumors approaches 90 percent in most series. The non-seminomatous germinal cell tumors are more ethal, and therapy requires a multidisciplinary approach, using surgery, radiotherapy, and chemotherapy.

This paper presents our recent experience with non-seminomatous germinal cell neoplasms of the testis, with special emphasis on surgical treatment.

Patient Material

From 1964 through 1971, 35 patients with malignant non-seminomatous testicular tumors have been treated. The patients ranged in age from two to 60 years, and none have been lost to followup.

Presenting Symptoms

It has been written and taught that most testicular tumors are painless. However, 24 (69 percent) of these patients had pain and swelling in the testis as the earliest signs of their disease. Furthermore, five (14 percent) had pain only. The remaining six (17 percent) became alarmed by a painless enlargement of the testis and this finding

alone prompted them to see their doctor.

In almost one-half of these patients, the nature of the disease was not immediately recognized by the patient's physician. In extreme cases, diagnosis was delayed three to six months.

Pathology

The histologic findings in these cases are summarized in Table 1.

TABLE 1

Tumor Type	Total No.	Pathology		Mortality
		With Pos. Nodes	With Neg. Nodes	
Embryonal	11	5	6	1
Terato Ca	6	4	2	1
Mixed	17	9	8	2
Teratoma	1	—	1	—
Total	35	18	17	4

Treatment

The treatment of these tumors is surgical, often augmented with radiotherapy and chemotherapy.

Surgical treatment of these neoplasms begins with the approach to the primary lesion. If a testicular tumor is suspected, the patient should be explored through a groin incision so that the cord can be cross-clamped at the internal ring before the testicle is mobilized. Next, the testicle and all of its connective tissue coverings are delivered into the wound. At this point the testicle is further isolated by covering the wound with towels. Every precaution must be taken to prevent these highly malignant tissues from 'seeding' the wound. In most cases, the neoplastic nature of the lesion is evident but, if a confirmatory biopsy is indicated, it is done by placing the distal cord and testicle in a pan and the biopsy is carried out as a "dirty" procedure. If the testicle is malignant, nothing that touches the tumor is used again. In fact, it is important to change gloves and gowns after the biopsy before completing the orchidectomy. The cord is divided as proximal as possible using electrocautery and the cut ends are fulgurated also to

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See editorial, page 621.

avoid the slightest chance of contamination. The proximal end of the cord is suture ligated and the sutures are left long so they can be identified at the subsequent radical retroperitoneal node dissection.

A suspected testicular tumor should never be biopsied using a transscrotal incision. The lymphatic drainage of the scrotum is to the superficial and deep inguinal nodes and to the lymphatics of the anterior abdominal wall. Thus, if a testicular tumor is inadvertently biopsied through the scrotum, the tumor can gain access to lymphatic drainage fields different from those of the testis and definitive therapy becomes more difficult. When a testis tumor has been biopsied or when a tumor has been removed using a scrotal incision, we refer to the wound as 'contaminated'.

One unusual aspect of our series is that 14 of our cases had 'contaminated' orchiectomies. As recently described by Markland,¹ this problem must be dealt with by a hemiscrotectomy, a wide excision of the inguinal area and a radical inguinal lymph node dissection. If the spermatic cord has not been excised completely, it should be removed. This operation is carried out before the retroperitoneal node dissection is done.

The retroperitoneal nodes can be approached either through the abdomen or transthoracically. The transthoracic technique was used throughout this series for several reasons. First, the transthoracic approach provides the best exposure to the lymphatics along the great vessels above the ipsilateral renal pedicle. Since the primary lymphatic drainage of the testicle is to the ipsilateral renal pedicle, the dissection must begin well above the renal hilum. Second, by reflecting the intact peritoneum medially, the entire procedure can be done so that there is no possibility of contaminating the abdominal cavity with tumor cells. Third, even though this approach involves opening the thoracic cavity, there is little morbidity.

The initial incision is made through the bed of the eighth or ninth rib, and carried medially across the ipsilateral rectus muscle, dividing the muscle and rectus sheath. Another gently curved incision is then made lateral to the rectus connecting with the upper incision and extending into the lower quadrant (Figure 1). After the peritoneum is retracted medially, complete exposure of the retroperitoneum allows an 'en bloc' retroperitoneal dissection, which encompasses the adrenal gland and

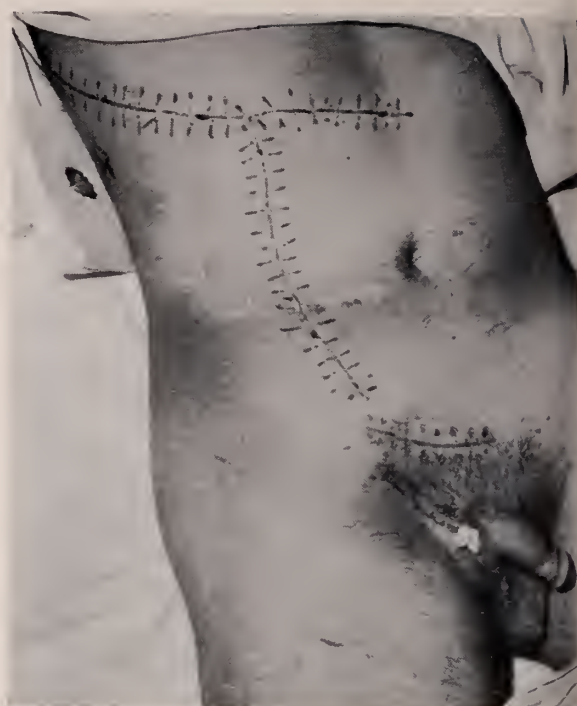


Fig. 1—This is a postoperative photograph of a patient who presented with a 'contaminated orchiectomy'. The incision of the hemiscrotectomy, inguinal orchiectomy and superficial groin dissection are shown. The upper incisions are those described in the text which are used for the retroperitoneal node dissection.

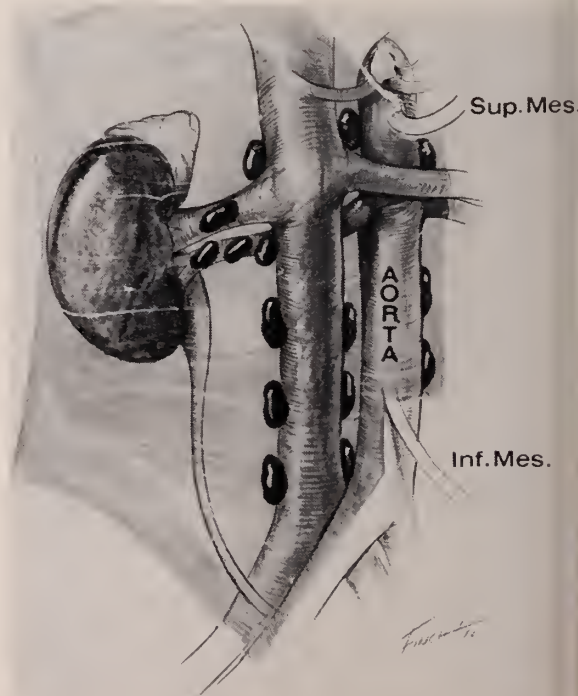


Fig. 2—The shaded area shows the tissues removed at the time of transthoracic retroperitoneal node dissection. The ipsilateral kidney and ureter are preserved but the adrenal is sacrificed.

is fascial coverings, the connective tissue envelope of the kidney, the tissues in the ipsilateral renal hilum and the paravertebral lymphatics and lymph nodes (Figure 2). All patients in this series had radical, transthoracic lymphadenectomy. There were no operative deaths.

If the retroperitoneal nodes are tumor-free, usually no additional therapy is given. If lymphatic metastases are present, the patient receives radiation or chemotherapy or, on occasion, both. The mode of supplementary therapy is determined by the histology of a primary tumor as well as the histology of the metastases. For example, if the primary tumor and the metastases are pure embryonal carcinoma, the patient is treated postoperatively only with Mithramycin.* But, if the primary tumor is a teratocarcinoma or a mixed tumor and if the metastases have a similar histology, usually the patient is given radiation to the retroperitoneum mediastinum, and the left supraclavicular region. An alternative to radiation therapy in this latter situation is triple drug chemotherapy as recently reported.² All cases are reviewed carefully by a team representing the disciplines of pathology, radiotherapy, medical oncology and urology.

Table 2 summarizes the various therapies given to patients in this series.

TABLE 2

Mode of Therapy	No. of Cases
ONLY Lymphadenectomy	17
Lymphadenectomy + Radiation	9
Lymphadenectomy + Chemotherapy	4
Combination of All Three	5
Total	35

Results

Of the 35 patients treated since 1964, six were followed for more than six months and 24 were followed for more than one year. The remaining five patients were followed less than six months, but they are all free of disease. Thus far, four patients have died of their cancer and 31 are alive and free of tumor. This is an overall survival rate of 87.1 percent. The results obtained in this series and in similar groups of patients from other institutions are summarized in Table 3.

All 17 patients with negative nodes are alive and well. Fourteen of eighteen patients with positive nodes are alive and well. Thus, approximately 78 percent of patients with positive nodes are

*Mithramycin—Pfizer.

†The thoracotomies were performed as separate procedures by Dr. Richard Varco and his associates.

TABLE 3
Survival of Patients with Non-seminomatous Germinal Cell Testicular Neoplasm Treated with Radical Orchiectomy Plus Radical Retroperitoneal Lymph Node Dissection with or without Irradiation and/or Chemotherapy

SERIES	No. of cases	Over all survival	
		No.	%
Patton, J. F. and Mallis, N.	143	89	62
Dyckhuizen, R. F., et al.	41	31	76
Maier, J. G., et al.	213	125	59
Skinner, D. G. and Leadbetter, W. F.	57	62	74
Staubitz, W. J., et al.	26	22	85
Whitmore, W. F., Jr.	102	68	66
Kaufman, J. J., et al.	64	53	82
Current Series	35	31	88

well and possibly cured. Two of these patients had positive nodes bilaterally; both of these patients are long term survivors. Also, three patients have had resections of solitary pulmonary metastases in addition to their retroperitoneal lymphadenectomy.[†] They survive, free of disease, six months, two years, and four years. The survival data on patients with positive nodes are presented in Table 4.

TABLE 4
Survival of Patients With Non-seminomatous Germinal Cell Testicular Neoplasm With Positive Nodes in Retroperitoneum

Institution	Total No. of Cases	Survivals	
		No.	%
Walter Reed Army Medical Center	101	45	45
M.G.H.	27	15	54
Memorial Hospital	41	18	42
UCLA	20	12	53
U of M	18	14*	78

*Out of these four deaths, two were known to have

Discussion

Until recently a diagnosis of non-seminomatous testicular cancer caused terror in the patient and his doctor. However, as reported herein and by others,³⁻¹⁰ multimodal therapy permits a new outlook for this disease. Whereas, in the past, treatment by radical orchiectomy and radiation alone produced an overall cure rate in non-seminomatous tumors of approximately 30 to 40 percent,⁵ now combined treatment with radical surgery, radiation, and appropriate chemotherapy has more than doubled the patient's chance for survival. Possibly even these figures can be improved as discussed herein.

A general principle in cancer is that early diagnosis gives the best chance for cure. When diagnosis in testicular cancer is delayed it is usually either because the patient pays little attention to

minimal early symptoms or because a physician fails to recognize the significance of a solid testicular mass. Although testicular cancer may be mistaken for a variety of abnormalities, it is more frequently misjudged as epididymitis, hydrocele, or hernia. In general, if there is any question as to the diagnosis of any scrotal mass, especially in young men, testicular cancer always should be excluded.

Of course, another possible consequence of incorrect diagnosis is that the testis may be explored and biopsied through a transscrotal incision. This report previously emphasized the seriousness of this error, pointing out that the skin of the scrotum and its lymphatics may be contaminated with tumor. Because the lymphatic drainage of the scrotum is different from that of the testis,

scrotal contamination of longstanding is almost impossible to treat by radical surgery alone. Fortunately, most of these patients are seen early and the ultraradical technique of hemiscrotoectomy and inguinal node dissection offers a chance to prevent the potential complication of local tumor recurrence.

An additional important aspect of this disease that must be recognized if results are to be improved, is that these patients require a therapeutic 'team' consisting of surgeons, radiation therapists and medical oncologists. The advantage of the 'team' approach is clear from the improved survival figures not only in our patients but in other series as well. Because this is an uncommon tumor there is a need to accumulate and treat these patients under uniform conditions so that further refinements in treatment can be developed.

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*Age is the most terrible misfortune that can happen to any man; other evils will mend, this is every day getting worse.**

*George Payne Rainsford James's: Richelieu.

Steroid-Induced Mediastinal Lipomatosis

GUAN C. CHONG, B.Sc., M.B.B.S., TALBERT COOPER, M.D., AND
W. SPENCER PAYNE, M.D.

WIDENING OF THE mediastinum due to deposition of benign fat is rare. That the fat deposition could be induced by prolonged treatment with high doses of corticosteroids has only recently been recognized;¹ however, 17 such cases have been reported in the past five years.¹⁻⁶ The true incidence of steroid-induced mediastinal lipomatosis is not established. Its apparent rarity may be related both to a lack of physician awareness and to the subtlety of clinical presentation. The present case report illustrates the clinical vagaries of the condition.

Report of Case

In December 1968, a 61-year-old Caucasian man was found to have positive results to Coombs' test and a diagnosis was made elsewhere of chronic hemolytic anemia. The genesis of this problem was indeterminate and empiric therapy with prednisone (40 mg daily) continued for the ensuing 17 months. The hemoglobin level ranged from eight to 12 gm/100 ml of blood during this period. The addition of azathioprine (Imuran) therapy for approximately one month was of no measurable benefit. In April 1970, when the patient was first examined in the Mayo Clinic, changes denoting Cushing's syndrome were apparent. No significant enlargement of superficial lymph nodes, liver, or spleen was detected.

Hematologic studies including positive Coombs' test affirmed the earlier diagnosis of hemolytic anemia. Roentgenograms of the chest showed no evidence of abnormality (Figure 1). Left supraclavicular nodes were removed and tissue sections showed nothing more than nonspecific inflammatory changes. Twenty milligrams of nitrogen mustard were administered intravenously and prednisone in a dosage of 20 to 40 mg daily was continued.

When the patient returned for reexamination in February 1971, the changes of Cushing's syndrome were increased. Roentgenograms of the chest showed widening of the superior mediastinum (Figure 2), and the possibility of lymphoproliferative disease was again considered. Lymphangiography, however, disclosed no abnormalities, but minor nonspecific filling defects were present in several femoral and iliac lymph nodes. Radioisotopic scans of liver and spleen appeared normal.

Mayo Clinic and Mayo Foundation, Rochester, Minnesota.

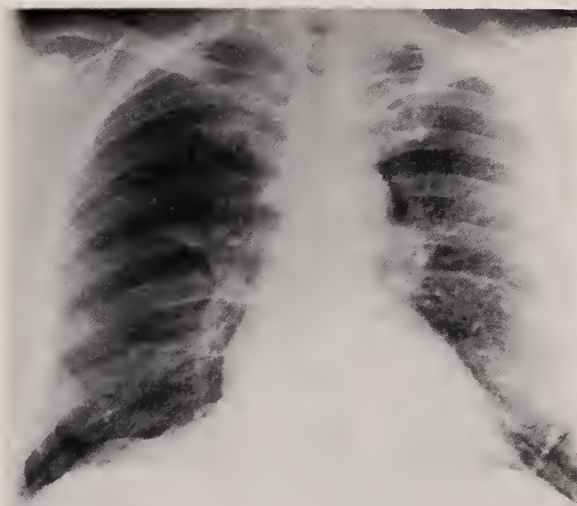


Fig. 1—Standard roentgenogram of chest in April 1970 after patient had been treated with steroids for 18 months; physical examination showed a moderate cushingoid appearance.

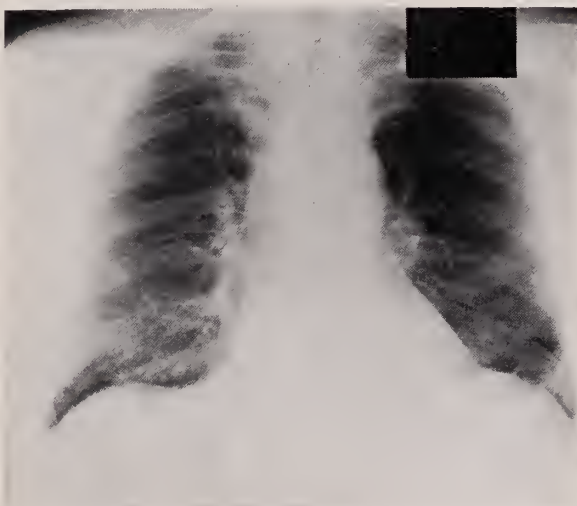


Fig. 2—Standard roentgenogram of chest made in March 1971 demonstrated widening of the superior mediastinum at mediastinoscopy.

Mediastinoscopy performed with the patient under general anesthesia, disclosed no significant lymphadenopathy but the superior mediastinum appeared to be infiltrated with fatty tissue. The nature of the tissue was confirmed on microscopic examination. Immediately thereafter exploratory laparotomy revealed no gross abnormalities but splenectomy was performed as a possible palliative measure for the idiopathic hemolytic process. Except for moderate hemosiderosis, sections of the spleen were free of abnormalities.

The dosage of corticosteroid was gradually reduced and finally discontinued in July 1971. Three months later a roentgenogram of the chest showed significant regression of the superior mediastinal widening (Figure 3). The patient then was symptomatically improved and the hemoglobin level was 15 gm/100 ml of blood.

During February 1972, his physical features appeared normal. Mediastinal widening was further reduced and laboratory studies provided evidence of a well-compensated hemolytic process.

Comment

Steroid-induced mediastinal lipomatosis was first documented by Koerner and Sun in 1966.¹ The condition is benign and apparently represents another facet of the centripetal deposition of fat seen in Cushing's syndrome. The clinical entity has been reported both in patients taking high doses of steroids^{1,3,6} and in Cushing's syndrome due to adrenal tumors.^{4,5} Usually the mediastinal widening is an incidental finding and causes no symptoms. All the patients with this condition showed development of moderate to severe, steroid induced features. Recognition of the condition is possible from serial roentgenograms of the chest, showing a gradual progressive development of a smooth and symmetric widening of the anterior superior mediastinum over months or years. Other

radiologic features include enlarged pericardial fat pads and the lack of extrinsic pressure effect on the airways. Confirmation of the diagnosis has rested on open thoracotomy,^{1,2} autopsy,² regression of mediastinal widening with withdrawal of steroids^{4,5} and, in the case presented here, mediastinoscopy and biopsy. *Since this is a benign condition, the suggested approach is confirmation of the diagnosis by mediastinoscopy.* Subsequent regression on follow-up roentgenograms of the chest made after corticosteroid medication had been discontinued for at least three months provided further confirmation in this case. Mediastinal widening, however, erroneously suggested the possibility of lymphoproliferative disease.



Fig. 3—Roentgenogram of chest made in November 1971 nine months after discontinuing steroid therapy. Mediastinal widening had regressed.

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O poppy Death!—sweet poisoner of sleep!
Where shall I seek for thee, oblivious drug,
That I may steep thee in my drink, and creep
Out of life's coil.*

*Thomas Hood: "Hero and Leander," 11. 535-538. 1827.

Mesodermal Mixed Tumor of the Corpus Uteri*

JOHN A. REICHERT, M.D.†

IN THE SHORT PERIOD from July 1, 1971 to December 1, 1971 three cases of mixed mesodermal tumor of the uterus were encountered at Hennepin County General Hospital. Although Piquand,¹ in 1905, stated that the ratio of this rare tumor to all malignancies of the uterine corpus was 1:7,500, more recent reports have indicated that this tumor is more common. In our hospital the ratio of mesodermal mixed tumors to all corporeal malignancies from 1940-1971 was 1:58.

Case Reports

Case 1

A 65-year-old, para 7-0-3-7 and 12 years postmenopausal was admitted with vaginal bleeding of two months' duration and increased bleeding and passage of tissue on the day of admission. Pelvic examination found the cervix 4 cm. dilated and containing a friable mass. The mass was biopsied and a D&C done. Both the biopsy tissue and the endometrial curettings were interpreted histologically as mixed mesodermal tumor. An abdominal hysterectomy and bilateral salpingo-oophorectomy were performed. The uterus measured 13 x 8 x 6 cm. and contained a polypoid tumor mass 3 x 4 x 2 cm. arising from the posterior wall of the corpus (Figure 1). Histologic sections showed involvement of myometrium but the tumor did not extend to the serosa.

The postoperative course was unremarkable and 17 months later there were no signs of recurrence.

Case 2

A 76-year-old, para 1-1-1-1 and 30 years postmenopausal, was admitted to the hospital with a brown vaginal discharge of five weeks' duration. Examination found the uterus irregular and about 16 weeks' gestational size.

A D&C produced only necrotic tissue. An abdominal hysterectomy and bilateral salpingo-oophorectomy were done. The uterus measured 14 x 6 x 9 cm. and one cut section showed light tan tissue infiltrating the myometrium (Figure 2). Histologic sections identified this as a mixed mesodermal tumor.

Twelve months after surgery the patient was asymptomatic with no evidence of recurrence.

*Presented at the Minnesota Obstetrical and Gynecological Society Meeting in Rochester, 29 April, 1972.

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Fig. 1—Polypoid tumor arising from right posterior wall of the endometrial cavity.

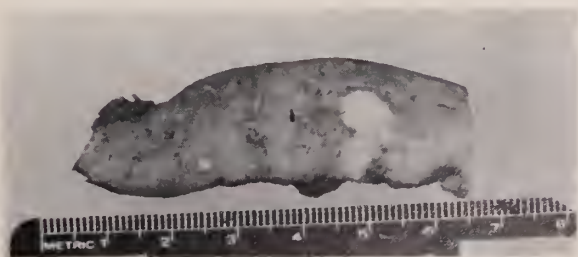


Fig. 2—Tumor shown infiltrating the myometrium.

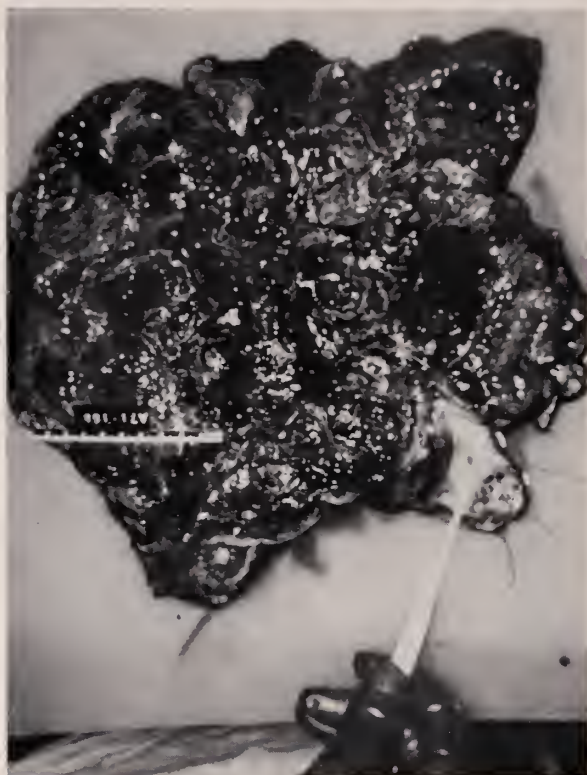


Fig. 3—Autopsy specimen with uterus opened, pointer on cervix.

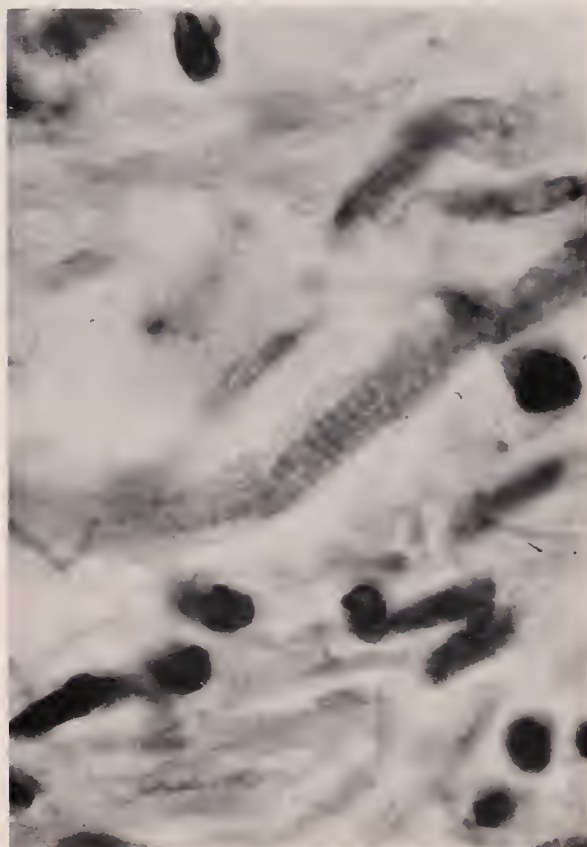


Fig. 4—Typical cross striations of rhabdomyocyte.

Case 3

A 57-year-old, para 3-0-1-3 and 18 years postmenopausal, was admitted to the hospital with nausea, emesis and weight loss for six weeks. Pelvic examination found an atrophic closed cervix. There was no bleeding from the os. Bimanual examination found a cystic mass arising from the pelvis and extending to the umbilicus. Following stabilization, a D&C was performed and the mass identified as the uterus. Forty cc. of tissue and 200 cc. of blood and purulent material were removed from the uterine cavity. At exploratory laparotomy extensive adhesions and local extension of the tumor made resection impossible. The patient expired on the second postoperative day following a massive pulmonary embolus.

At autopsy the uterus measured 24 x 20 x 18 cm. and weighed 3,700 grams. The tumor appeared to arise just above the cervix and histologically was a mixed mesodermal tumor (Figures 3 and 4). There was infiltration of neoplastic cells into the serosa of both the large and small bowel and encircling the right ureter.

Classification

The diagnosis and management of mixed mesodermal tumors have represented an enigma to the gynecologist. That they are relatively rare but highly malignant has been well established, but the assignment of over 100 different names to these tumors partially reflects the confused appreciation of their true nature.² Essentially, a mixed mesodermal tumor is composed of specialized mesodermal tissue. In the past, this designation has been applied to a variety of uterine neoplasms including sarcoma botryoides, carcinosarcoma, endometrial stromal sarcoma, and only rarely to a specific neoplasm characterized by the presence of heterologous mesenchymal elements.^{3,4,5,6} Heterologous in this instance refers to a tumor composed of elements which have no benign counterpart in the uterus (i.e., elements, such as fat, striated muscle, bone, cartilage, etc.)

Incidence

The rarity of this tumor can be appreciated by the recognition that sarcomas make up about one percent of all uterine cancers, and mixed mesodermal tumors represent about 15-20 percent of uterine sarcomas.^{3,7} The greater diagnostic success in recent years is undoubtedly due to an increased awareness of the lesion and a high index of suspicion.

The literature indicates that patients represent all races and have a wide range of parity from nulligravid to grandmultiparity.⁸ The mean age

s about 60 with the vast majority postmenopausal.⁹

In most series, between 10-25 percent of patients have had a previous history of irradiation—usually for benign uterine bleeding^{6,8} or carcinoma of the cervix with a usual lag period of 5-20 years.¹⁰

Gross

The tumor generally arises from the endometrium of the posterior wall with rapid growth projecting into the cavity as a solitary or multiple growth and often resembling a benign polyp as represented clinically by the first case.¹¹ When more advanced, as demonstrated by the second and third cases, areas of necrosis and hemorrhage may be found with infiltration of tumor into the myometrium and beyond to the serosa.⁴

Histology

Microscopically, these tumors show considerable variations in structure and in different parts of the same tumor. Usually the sarcomatous part of the mixed tumor predominates, although areas containing epithelium, benign or malignant, are not uncommon.^{11,12} The sarcomatous features include: (a) Rhabdomyosarcoma, (b) Osteogenic sarcoma, (c) Chondrosarcoma, (d) Liposarcoma and (e) Embryonal sarcoma.

Metastases

Generally, the tumor is confined to the uterus when first diagnosed, but extension through the myometrium and serosa with involvement of contiguous structures in the pelvis and abdomen is not uncommon.^{11,12}

This spread indicates a predilection for local extension of the tumor, but lymphatic and hematogenous metastases are not rare.^{9,13} Generally, distant metastases are to the lungs and liver of either sarcomatous or carcinomatous elements—occasionally of both.^{3,11}

Histogenesis

Histogenetically, the mixed mesodermal tumors are thought to arise from multi-potential cells within the stroma that have the capacity to differentiate into both epithelium and stroma. The stromal cells, by virtue of this inherent metastatic potential, can undergo transformation to

other types of mesenchymal cells, such as cartilage, striated muscle or osteoblasts, thus forming the heterologous elements so prominently displayed in mixed mesodermal tumors.^{3,6,14}

Symptoms and Signs

Bleeding and discharge are the most common symptoms for which these postmenopausal patients seek medical help. The median duration of these symptoms is two months. Abdominal or pelvic pain may be present, and when the tumor is advanced, intestinal symptoms and weight loss may be observed. About 75 percent of patients have enlargement of the uterus when first seen. In about 25 percent of the cases, viable tumor may be seen within the cervical canal or protruding from the external cervical os.^{4,8,11}

Diagnosis

A punch biopsy of the mass presenting in the cervix or a D&C establishes the diagnosis in approximately 50 percent of cases in which it is done. In the remainder the large amount of necrotic tissue may prevent diagnosis. Sarcoma or adenocarcinoma is often the initial diagnosis on curettage specimen.⁸

Prognosis

The majority of these tumors recur within a year, although occasionally the first recurrence is three to five years after treatment. The overall five-year survival varies from report to report but usually is 15-20 percent.^{8,9}

Treatment

Many different types of treatment have been employed for mixed mesodermal tumor. Most oncologists believe that radiotherapy offers very little if any control of this neoplasm. Adequate and prompt operation is the treatment of choice and should consist of a total abdominal hysterectomy and a bilateral salpingo-oophorectomy. To the present time, chemotherapy has been of little value, although palliative results in sporadic cases have been reported using cyclophosphamide.⁹

Conclusions

The highly malignant nature of this tumor has been well established. Unfortunately, the symptoms appear when the tumor is already in an advanced biologic stage.

The duration of symptoms, the histologic grade, and the anatomic extent of the tumor have all been used as prognostic indices. The findings of extension beyond the uterus at laparotomy makes the outlook for survival almost hopeless. There are instances, however, in which lesions have extended beyond the uterus yet have survived over five years.

Whether or not radiation therapy may be etiologic in the development of this malignancy is

speculative. Irradiation therapy for dysfunctional bleeding is seldom used today, but irradiation therapy is the preferred mode of therapy in many clinics for carcinoma of the cervix. It will be interesting to see whether there is a decreased incidence of these tumors in the years to come.

The hopes for increased cure rates would seem to rest not only in earlier diagnosis but also in newer therapeutic approaches.

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A man were better twenty times be a bandog and bark,
 Than here, among such a sort, be parish priest or clerk,
 Where he shall never be at rest one pissing-while a day,
 But he must trudge about the town, this way and that way,
 Here to a drab, there to a thief, his shoes to tear and rent,
 And, that which is worst of all, at every knave's commandment!
 I had not sit the space to drink two pots of ale
 But Gammer Gurton's sorry boy was straightway at my tail,
 And she was sick, and I must come—to do I wot not what!
 If once her finger's end but ache, "Trudge! Call for Doctor Rat!"*

*Gammer Gurton's Needle, Act IV, scene i. 1575.

Harold W. Brunn

Harold W. Brunn, Executive Secretary of the Minnesota State Medical Association, has been elected President-elect and a member of the Board of Directors of the American Association of Medical Society Executives (AAMSE). He previously served as Secretary Treasurer and Director. AAMSE is a national organization of executive directors of national, state and county medical associations and societies.

Brunn was elected President at the annual meeting of AAMSE Saturday, June 23, held in conjunction with the 122nd Annual Convention of the American Medical Association in New York City.

The Fate of the Abandoned Bladder

JOHN T. CAMPBELL, M.D.,* JAMES H. DeWEERD, M.D.* and DAVID C. UTZ, M.D.*

RECENT REVIEWS indicate that if the defunctionalized bladder becomes the seat of retained purulent secretions, resulting in vesical empyema, then cystectomy is inevitable in the vast majority of reported cases, irrespective of the type of bladder disease.¹⁻⁸ Others point out that simple cystectomy is not without risk. Jaffe and associates⁵ present data suggesting that cystectomy associated with urinary diversion doubles the mortality rate, even for benign disease.

A retrospective study was designed to examine our surgical experience at the Mayo Clinic in which supravescical urinary diversion was done without concomitant cystectomy. Specifically, the fate of the abandoned bladder is in question for both benign and malignant disease.

Methods and Materials

During the three-year period from 1967 through 1969, 50 patients at the Mayo Clinic underwent supravescical urinary diversion without cystectomy. The patients' ages ranged from 15 days to 80 years; half the patients were male.

Basic disease processes included both malignant and benign entities (Table 1). Carcinoma accounted for 20 cases (40%) in the series. Neurogenic vesical dysfunction was present in 14. Congenital anomalies in another 11 cases included a wide range of obstructive features inevitably responsible for hydronephrosis, pyelonephritis, and renal destruction.

Indications for surgical intervention were related to symptoms, uncontrollable infection, deterioration of upper tracts, or the presence of carcinoma (Table 2). There were often several factors as surgical indications.

Modalities of urinary diversion are recorded in Table 3. Many patients had experienced the failure of previous surgical procedures. Not infrequently, patients were seen with advanced disease, which narrowed the possibilities of the surgi-

cal approach. The route of diversion oftentimes had to be tailored to the severity of the disease. Every procedure involved abandonment of the bladder. Most of the bladders were no longer suitable as a urinary reservoir.

The reasons for not doing cystectomy at the time of urinary diversion differed. For 27 patients, cystectomy could not be justified on the basis of the underlying disease or circumstance. In 18 patients with carcinoma of the bladder or cervix, cystectomy was either technically impossible because of bladder fixation or inadvisable because of the advanced stage of metastatic disease. In the remaining five patients, the bladder

TABLE 1
Basic Diseases in 50 Patients Undergoing
Supravescical Urinary Diversion Without Cystectomy

Disease	No.
Carcinoma of bladder	14
Carcinoma of cervix	6
Neurogenic vesical dysfunction	14
Congenital anomalies	11
Exstrophy	2
Interstitial cystitis	1
Chronic cystitis	1
Ureterovaginal fistula	1

TABLE 2
Indications for Surgery in 50 Patients Undergoing
Supravescical Urinary Diversion Without Cystectomy

Indication	No.
Contracted bladder	23
Incontinence	18
Chronic infection	11
Upper tract deterioration	15
Cancer present	18
Vesical vaginal fistulae	3
Vesicoureteral reflux	4
Hematuria	2
Obstruction	4

TABLE 3
Types of Supravescical Urinary Diversion in 50 Patients

Diversion	No.
Ileal conduit	21
Sigmoidal conduit	3
Ureterosigmoidostomy	12
Cutaneous ureterostomy	8
Nephrostomy	5
Cutaneous pyelostomy	1

*Mayo Clinic and Mayo Foundation, Rochester, Minnesota.

See editorial, page 618.

abandonment was temporary.

Findings

Eight of the 50 patients had symptoms referable to the abandoned bladder (Table 4). Droplet hemorrhage through the urethra was a nuisance factor for two patients who had carcinoma of the bladder, but this was not associated with pain and did not require blood transfusion. Frankly bloody urethral discharge occurred in a 15-year-old boy who originally had urethral valves, and this led to the discovery of cystitis glandularis for which cystectomy was done. Two patients each had purulent foul discharge, characteristic of pyocystitis but without sepsis: one of the patients was managed successfully by saline lavage twice weekly for several weeks, and the other required no treatment and has subsequently been asymptomatic. Three patients had bladder spasms manifested by suprapubic discomfort, cramping, and a suprapubic mass; all three had underlying vesical carcinoma. Two of the three had total urethral obstruction with tumor; cystectomy was done in one and was impossible in the other. The third patient with bladder spasms had recurrent bladder tumor and radiation cystitis from radon-seed implants.

TABLE 4
Relationships of Bladder Symptoms,
Urethral Disease, and Ultimate Cystectomy in
50 Patients Who Had Supravesical Urinary Diversion

Diagnosis	Bladder symptom	Urethral disease	Cystectomy
Exstrophy	None	None	Yes
	None	None	Yes
Neurogenic vesical dysfunction	None	Valves	No
	Discharge	None	No
Obstruction	Discharge	None	No
	None	Post. stricture	No
	None	Valves	No
	Hemorrhage	Valves	Yes
Bladder cancer	Hemorrhage	None	No
	None	Tumor	No
	Spasm	None	No
	Spasm	Tumor	No
	None	Tumor	No
	Hemorrhage	None	No
	Spasm	Tumor	Yes
	None	Tumor	No

Comment

The source of fluids retained in obstructed isolated bladders remains only partially explained. Active mucosal transfer of water and ions and mucosal glandular secretions have been suggested as basic mechanisms of bladder fluid production.^{9,10} Others have claimed that, in the male, most fluid is derived from retrograde ejaculation or resting prostatic and genital secretions.¹¹ The retention of bladder fluid is asymptomatic unless infection supervenes.

All agree that obstruction of the vesical neck or urethra predisposes the abandoned bladder to retention of secretions and to infection. Animal studies lend credence to this concept.⁷ Once pyocystitis is established, management with systemic antibiotics and local lavage is useless unless the obstruction has been surgically removed. To this end, Spence and Allen¹² have recommended the creation of a vaginal vesicostomy for empyema of the abandoned bladder. Malek et al.⁶ believe that if a bladder will not empty it should be removed if circumstances permit.

In our experience, the abandoned bladder has not been a tremendous source of concern to surgeon or patient. Only eight of the 50 in our series had symptoms referable to the bladder. Of the four who ultimately required cystectomy, two had exstrophy as part of a deliberately staged cystectomy. Only two of the 50 had findings consistent with underlying pyocystitis; neither patient required cystectomy. This has not been the experience in other large series^{4,6,12} in which the symptoms of pyocystitis failed to respond to conservative management.

Bladder symptoms occurred relatively frequently in the patients with cancer, who comprised 40% of the patients in our series. Occasionally, tumor invasion was associated with obstruction of vesical neck and proximal urethra. In two patients (one male and one female), this progressed to its logical conclusion—a sealed bladder. In the female, the seal was penetrated by instrumentation, thus reestablishing drainage. The male underwent cystectomy, during which 500 ml of watery, tea-colored fluid were removed. Other bladder symptoms in the patients with cancer were relatively mild. Yet all 14 patients with carcinoma of the bladder died of their disease: 12 died within 18 months after urinary diversion.

Summary

The fate of the abandoned bladder was reviewed in 50 patients who had undergone urinary diversion without cystectomy. The series included 14 patients with advanced carcinoma of the bladder, all of whom died within four years after urinary diversion. Obstruction was the primary basis for the retained bladder secretions. Bladder symptoms including urethral purulent discharge, urethral droplet hemorrhage, and bladder spasms occurred in only eight patients; five of these had underlying carcinoma of the bladder. Cystectomy

was done in four patients, including two who had xstrophy, one who had cystitis glandularis, and one who had his bladder outlet sealed by tumor. Most patients with abandoned bladder were symptomatic, and most patients in whom symptoms developed were managed conservatively. In

our experience with the abandoned bladder after urinary diversion, the ultimate results have been sufficiently satisfying that, in the absence of outlet obstruction, we continue to favor leaving the bladder undisturbed, when cystectomy for underlying disease cannot be justified.

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Duplay's Syndrome

This commonly observed calcifying tendinitis or peritendinitis involving the shoulder area constitutes one of the etiologic components of the supraspinatus syndrome. It was first described by Duplay (1896) as "scapulohumeral periarthrititis."

Cardinal symptoms consist of pain and limitation of motion of the shoulder joint. Calcification is frequently present in both shoulders and may long be asymptomatic. When pain does occur, it may be quite intense and often prevents sleep despite generous doses of narcotics. Three varieties of "frozen shoulder" have been described: (1) a localized form with general articular involvement, in persons under 40 years of age; (2) a degenerative form, in persons over 40 years of age; and (3) a posttraumatic form from a tear in the rotation cuff.

One theory concerning cause of the calcium deposition includes occlusion of the vessels of the tendon from hypertrophy of the tunica media. As in aseptic necrosis of the head of the humerus or elsewhere, local necrosis of the tissues occurs, followed by the deposition of calcium. Almost immediate relief may be obtained by opening the tendon capsule surgically. Many cases will respond promptly to the local injection of an anesthetic agent, as procaine and hydrocortisone. Irradiation of the area also affords gradual relief of pain and, in many instances, complete disappearance of the calcific deposit within a few months.

Durham, Robert H—*Encyclopedia of Medical Syndromes*
Hoeber Medical Division, Harper and Row, New York

Health Officer Appointment

Mayor Lawrence D. Cohen of St. Paul announced today that Dr. Clarence E. Henke will be the chief health officer for the Division of Environmental Protection of the Community Services Department.

Dr. Henke, a native of South St. Paul, has since April 1, 1973, been a full-time staff member of the Ambulatory Care Section of St. Paul-Ramsey Hospital with responsibilities for organizing multiphasic and occupational health clinics and coordination of community health programs.

The Case of the Missing Vas

Unilateral Absence of the Vas Deferens

ROBERT B. BENJAMIN, M.D.* and ALAEDDIN MOGHADDAM, M.D.†

VASECTOMY HAS become one of the more common methods of contraception. It is estimated that over one million vasectomies are performed annually in the United States. One of the problems occasionally encountered during vasectomy is unilateral absence of the vas deferens. Knowledge regarding the significance of this anomaly is important to all surgeons who perform vasectomies. We have developed a *modus operandi* which will result in less trauma to those patients who are found to have unilateral absence of the vas deferens.

Congenital absence of the vas deferens was

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first reported by Demell in 1926.¹ Since then papers on *bilateral* absence of the vas deferens have been published.²⁻⁷ These earlier studies were done on patients complaining of *sterility*. This study concerns a group of *fertile* patients seen because they were seeking vasectomies for sterilization. We first reported these cases at the National Conference on Vasectomy in 1971. Since then other authors have reported unilateral absence of the vas deferens in patients undergoing vasectomy.⁸⁻¹⁰

Method

At the St. Louis Park Medical Center over a period of ten years (1960-1970), 3,000 vasectomies for sterilization were performed. Thirteen

TABLE
Vasectomy Patients with Congenital, Unilateral Absence of Vas Deferens

Patient	Age	Side on which vas was absent	X-ray findings	Findings on physical examination
Case 1 19-09-87	38	Left	Atrophic left kidney (less than 4 cm in length). Hypertrophy of right kidney —nearly 17 cm in length. Normal left ureter.	Vas deferens not palpable on left.
Case 2 17-60-38	27	Left	Absence of left kidney. Hypertrophy of right kidney.	Vas deferens not palpable on left.
Case 3 19-83-62	22	Left	Crossed renal ectopia. Both kidneys found on right side with upper poles fused.	Vas deferens not palpable on left.
Case 4 16-26-71	31	Left	Absence of left kidney. Hypertrophy of right kidney.	Vas deferens not palpable on left. Left lobe of prostate is smaller. No seminal vesical palpated on left.
Case 5 18-08-91	34	Right	Absence of right kidney. Hypertrophy of left kidney.	Vas deferens not palpable on right.
Case 6 15-11-32	42	Right	Normal kidneys bilaterally.	Vas deferens not palpable on right.
Case 7 17-12-86	33	Left	Normal kidneys bilaterally.	Vas deferens not palpable on left.

Comment

Evaluation of the urinary tract in patients with unilateral absence of the vas deferens is more than a matter of academic curiosity. One should be aware of the serious implications of a congenital solitary kidney. Campbell states that one-fourth of his patients with a solitary kidney died of renal failure.⁷ Some investigators have shown that patients with a solitary kidney suffer a higher incidence of disease than do those with two normal kidneys.

Modus Operandi

During a vasectomy procedure, if one is unable to palpate a vas deferens on one side, we do not believe the patient should be subjected to a thorough dissection of the spermatic cord structures. It has been our experience that such explorations do not result in finding a vas deferens if one was not previously found by palpation. It is better to desist with the vasectomy after operating on the contralateral vas deferens. A sperm count will later prove whether the patient has only one vas deferens.

Summary

In our series of 3,000 patients undergoing vasectomies, seven were found to have congenital unilateral absence of the vas deferens, an incidence of 0.23% in *fertile* males. The diagnosis can be made by careful physical examination. If a vas deferens cannot be palpated, exploration of the spermatic cord is not likely to be fruitful and does not appear to be indicated. Excluding those cases where previous surgery for hernia or undescended testis has been performed, we have found that clinical evaluation of the spermatic cord was as reliable as exploration and dissection. Consequently, we advise no extended surgery in patients who are found, on palpation, to have only one vas deferens. These patients should be followed up with a semen examination two months following surgery. If no sperm are seen, the patient has then been proven to have only one vas deferens. In all patients with unilateral absence of the vas deferens, intravenous pyelograms should be obtained because of the probability of congenital absence of the ipsilateral kidney and ureter or other urinary tract abnormalities.

Embryology

The ureter is formed by a posterior budding of the wolffian duct which itself ultimately becomes the vas deferens. Thus, absence of the wolffian duct would be expected to result in absence of both the ureter and the vas deferens. This embryologic development is considerably different from that which occurs in *bilateral* absence of the vas deferens. In fertile males undergoing vasectomy for purposes of sterilization, unilateral absence of a vas deferens generally appears to be associated with absence or abnormality of the ipsilateral ureter and kidney, indicating that the wolffian duct has been absent from early embryonic life.^{6,7} An understanding of this embryology is important to surgeons who operate upon the vas deferens.

References 1-10 may be found on page 610.

Traumatic Sudden Deafness

or

A Scuba Diver Gets It—In The Ear

JOSEPH H. LEEK, M.D.* and RICHARD L. RIESS, PH.D.†

SUDDEN DEAFNESS is a catastrophe that can befall an individual of any age. It may be fleeting or permanent, leaving a profound hearing deficit. The etiology has been speculative, with a viral or a vascular lesion being attributed as the cause for the majority of such cases.⁶ Treatment has been empirical and subject to much criticism.³

Goodhill recently suggested some etiologic features that relate to therapy.⁴ A patient, with symptoms similar to Goodhill's presented himself for treatment.

In 1968 Simmons⁶ was of the opinion that certain cases of sudden deafness might be the result of ruptures, breaks, or dislocations of intracochlear membranes. He reviewed 15 patients whose clinical pattern fitted this type of sudden deafness. Each had normal hearing in the affected ear prior to the incident and each could document exactly when the damage occurred—a "pop" was heard or felt immediately preceding the decrease in hearing. No vertigo was associated with this hearing loss and no vestibular symptoms occurred subsequently. No patient had any evidence of respiratory, cardiovascular or endocrine disease. To replace the label "etiology unknown," now applied to about 30% of sudden hearing loss, Simmons suggested the term "membrane rupture."

Goodhill,³ in his presidential address to the Trilogical Society in 1971, spoke about sudden deafness following physical exertion and presented four examples: (1) Following a scuba dive; (2) After numerous sit-ups; (3) Following an alcoholic debauch. (4) While cheering and rooting at a football game. Surgical intervention in the last three cases showed that these patients all had oval window perilymphatic fistulae.

One of four patients, suspected by Pullen⁵ of having possible intracochlear membrane rupture

causing sudden deafness, had sustained damage following scuba diving. Exploratory tympanotomy revealed a fistula of the round window, which was repaired with restoration of normal hearing.

The term "inner ear barotrauma" was suggested by Freeman² to describe sensori-neural hearing loss due to atmospheric pressure shifts. Five of his patients were divers who had difficulty clearing their ears on descent into the water. They had hearing losses which varied on audiogram from high tone sensori-neural defects to total loss of cochlear function. Freeman thought that none of these hearing defects could be attributed to decompression sickness. No surgical exploration was done on these patients. Goodhill⁴ postulated that round or oval window membrane rupture or rupture of both membranes could have occurred in these divers and that surgical repair of these perilymphatic fistulae might salvage the hearing in such individuals.

It was Goodhill's letter that motivated us to consider surgical exploration and possible repair when our patient described symptoms suggestive of inner ear barotrauma. Both the physical findings and an audiogram supported this impression. The potential urgency for instituting definitive care in this problem, as well as the often favorable outcome following surgical repair is illustrated in this case.

Case Report

A 19-year-old college student scuba diving in Lake Superior descended to 43 feet. Rushes of pain in his left ear forced him to ascend a few feet. Four or five repetitions of the descent were accompanied by the same type of pain so that he surfaced. He immediately noted pressure and fullness with a hearing defect and buzzing in the left ear. He had no vestibular symptoms. The following day he visited a physician who found no ear canal or drum abnormality and gave the opinion there had been middle ear trauma which would resolve spontaneously in a few days. He prescribed a topical

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†Department of Audiology, Duluth Clinic, Duluth, Minnesota.

ar solution.

The pressure, fullness, hearing loss, and tinnitus in the ear remained unchanged. We saw this patient on the eleventh day. The left ear appeared normal, and pneumatic massage of the drumhead revealed no abnormality. No disease was evident at the completion of a general physical examination.

Audiovestibular testing showed the Rinne test positive on the right, negative on the left and the Weber test lateralizing to the right, (using a tuning fork of 256 vibrations per second). The pure tone air and bone conduction audiogram (Figure) demonstrated a moderate sensori-neural loss. The speech reception threshold was 55 decibels but the speech discrimination score remained normal. There was mild recruitment but a negative short increment sensitivity index (SISI) response. Ice water caloric vestibular studies gave normal results.

Tympanotomy, done on the 14th day after the injury, disclosed a middle ear which was air-containing. No ossicular lesion was found. However, the round window niche seemed bottomless and, crossing this window, was a thin membranous strand. Glistening fluid pulsed on either side of the strand. When dry gelfoam was placed in the round window niche, it immediately became saturated with colorless perilymph. After preparing the bony margins of the window, repair was completed with a tissue plug of ear lobule fat to close the round window defect.

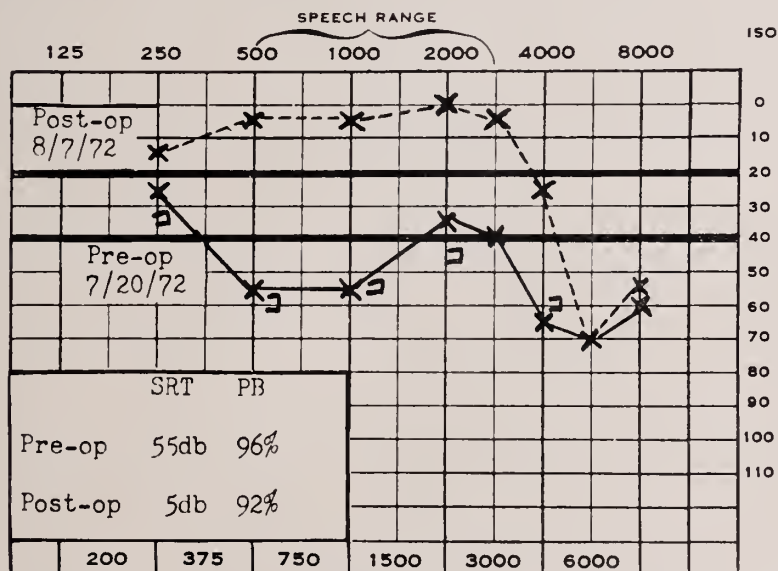
When the dressings were removed one week postoperatively, the patient immediately found that the hearing was improved. This was borne out by the postoperative audiogram (Figure), showing complete recovery. This has been sustained, at the time of this writing, for six months.

Discussion

The identification of inner ear barotrauma, re-

sulting in membranous rupture, gives a specific etiology for certain cases of sudden deafness.^{1,6} Some of these ruptures appear to be correctable by surgical repair with restoration of hearing. The diagnosis must be arrived at by careful evaluation. Obviously every case of sudden deafness is not secondary to a ruptured intracochlear membrane and unnecessary surgical explorations must be avoided. The basic clues appear in the history of onset, with the "popping" sensation felt so distinctly by an otherwise healthy patient after a specific exertional event. Characteristically he will be aware immediately of a hearing loss without vestibular symptoms. This sequence of events should alert the physician to consider barotrauma. If such a diagnosis can be supported by clinical evaluation and if spontaneous recovery does not occur during several days of bedrest, surgical intervention is in order.

Exploration of the middle ear, in an attempt to locate a perilymphatic fistula, should present no difficulty to an otologist trained in microsurgical techniques. A large round window membrane defect was in direct view when the middle ear of our reported patient was explored. If a bony overhang obscures a direct view of such a ruptured membrane, dry gelfoam can be used in the area of the window. If the gelfoam becomes repeatedly saturated with clear fluid, conclusive evidence of a fistula is demonstrated. After the surrounding bony surface is adequately



Figure—The left ear audiogram demonstrating the cochlear hearing defect in solid lines and the subsequent recovery in dotted lines.

prepared, a tissue plug or piece of gelfoam should serve as an adequate new membrane to seal the fistula.

Apparently a perilymphatic fistula of several days' duration does not seem to doom the cochlea to irreparable injury. Although the potential of contamination of the perilymph and the cerebrospinal fluid exists via the eustachian tube, evidently there is sufficient washing of the area by perilymph to act as a protective barrier.

A safe time interval between the trauma and

surgical exploration is unknown. In our case the lesion was fourteen days old. Emergency repair of such injuries is not proposed. Hospitalization, with bed rest, is recommended for seven to ten days. If no recovery ensues then surgical intervention is advisable. As long as eighteen days after the injury, rapid spontaneous recovery has been reported.⁷ In these instances, it is assumed that the fistula seals by secondary intention, accomplishing the same thing that we do with surgical repair.

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Request for Physician's Art Work

For many years the Board of Editors of MINNESOTA MEDICINE has recognized and supported photographic and other artistic talents of the members of the Minnesota State Medical Association publishing cover pictures in color of their work. Our series of color covers have received much favorable comment and many journals have followed us in the use of color art in this manner.

We solicit color photographs including pictures of all art forms created by members of the Association. These must be technically excellent to show off the subject to its best advantage.

Although in the past we have printed cover pictures depicting many distant parts of the world, photographs of life in Minnesota will be given preference. Pictures will be returned if identified with the name and address of the physician. Please submit your picture as prospective cover subjects to the Editor of MINNESOTA MEDICINE, 375 Jackson St., St. Paul, Minnesota 55101.

Farrell Stiegler, M.D.
Cover Editor

Healing nicely, but it still **HURTS**

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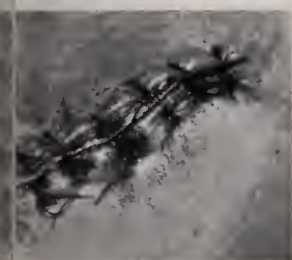
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Warnings: Patients with severe cardiac disease should be given this medication with caution.

Fever and possibly heat stroke may occur due to anhidrosis. In theory a curare-like action may occur, with loss of voluntary muscle control. For such patients prompt and continuing artificial respiration should be applied until the drug effect has been exhausted.

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Adverse Reactions: Varying degrees of drying of salivary secretions may occur as well as mydriasis and blurred vision. In addition the following adverse reactions have been reported: nervousness, drowsiness, dizziness, insomnia, headache, loss of the sense of taste, nausea, vomiting, constipation, impotence and allergic dermatitis.

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Contraindications: Pre-existing elevated serum potassium. Hypersensitivity to either component. Continued use in progressive renal or hepatic dysfunction or developing hyperkalemia.

Warnings: Do not use dietary potassium supplements or potassium salts unless hypokalemia develops or dietary potassium intake is markedly impaired. Enteric-coated potassium salts may cause small bowel stenosis with or without ulceration. Hyperkalemia (> 5.4 mEq/L) has been reported in 4% of patients under 60 years, in 12% of patients over 60 years, and in less than 8% of patients overall. Rarely, cases have been associated with cardiac irregularities. Accordingly, check serum potassium during therapy, particularly in patients with suspected or confirmed renal insufficiency (e.g., elderly or diabetics). If hyperkalemia develops, substitute a thiazide alone. If spironolactone is used concomitantly with 'Dyazide', check serum potassium frequently — both can cause potassium retention and sometimes hyperkalemia. Two deaths have been reported in patients on such combined therapy (in one, recommended dosage was exceeded; in the other, serum electrolytes were not properly monitored). Observe patients on 'Dyazide' regularly for possible blood dyscrasias, liver damage or other idiosyncratic reactions. Blood dyscrasias have been reported in patients receiving Dyrenium (triamterene, SK&F). Rarely, leukopenia, thrombocytopenia, agranulocytosis, and aplastic anemia have been reported with the thiazides. Watch for signs of impending coma in acutely ill cirrhotics. Thiazides

are reported to cross the placental barrier and appear in breast milk. This may result in fetal or neonatal hyperbilirubinemia, thrombocytopenia, altered carbohydrate metabolism and possibly other adverse reactions that have occurred in the adult. When used during pregnancy or in women who might bear children, weigh potential benefits against possible hazards to fetus.

Precautions: Do periodic serum electrolyte and BUN determinations. Do periodic hematologic studies in cirrhotics with splenomegaly. Antihypertensive effects may be enhanced in postsympathectomy patients. The following may occur: hyperuricemia and gout, reversible nitrogen retention, decreasing alkali reserve with possible metabolic acidosis, hyperglycemia and glycosuria (diabetic insulin requirements may be altered), digitalis intoxication (in hypokalemia). Use cautiously in surgical patients. Concomitant use with antihypertensive agents may result in an additive hypotensive effect.

Adverse Reactions: Muscle cramps, weakness, dizziness, headache, dry mouth; anaphylaxis; rash, urticaria, photosensitivity, purpura, other dermatological conditions; nausea and vomiting (may indicate electrolyte imbalance), diarrhea, constipation, other gastrointestinal disturbances. Rarely, necrotizing vasculitis, paresthesias, icterus, pancreatitis, and xanthopsia have occurred with thiazides alone.

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Editorials

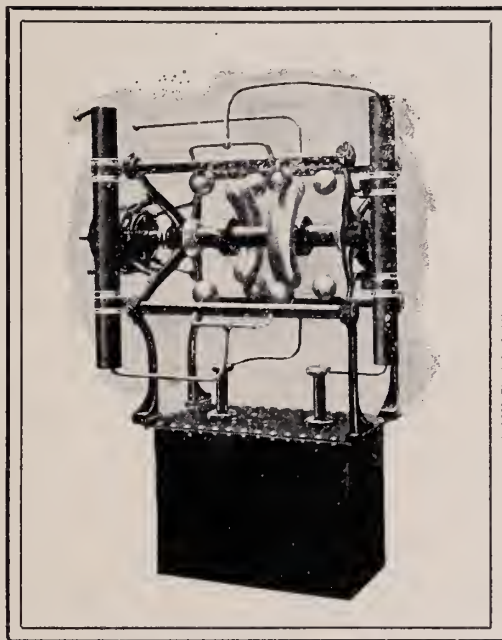
Fifty Years of Medical Practice

PAR FOR LENGTH OF MEDICAL practice is half a century, 50 years. The word "par" is used in the golf sense of a standard of excellence, a mark to shoot at. This year 18 Minnesota physicians complete their fiftieth year of practice in the State of Minnesota, they have been inducted into the 50 Year Club of the Minnesota State Medical Association: their biographies are to be found in this issue*

Fifty years ago focal infection was big in the minds of medical people, and many teeth and tonsils were sacrificed to eradicate this bogeyman. But the most important medical issue of the day was to discover the proper use of the newly released insulin. Russell Wilder of the Mayo Clinic in 1923 in an article entitled "How is the

Overworked General Practitioner to Use Insulin?" anticipating many of his colleagues by half a century stated: "In order to avoid the pitfalls of acidosis on the one hand, and insulin shock on the other, Geyelin has allowed a moderate glycosuria in all his juvenile cases. In the earlier stages of his work, when with others, he was making an effort to maintain a constantly sugar-free urine, he encountered relatively frequent, and sometimes severe, symptoms of insulin overdosage; whereas since his later plan was adopted he has had evidence of insulin shock mildly in only one case. Our experience in the treatment of seventeen children under twelve years of age entirely corroborates that of Geyelin, and we believe with him that, for the time being at least,

*See page 625.



PRECISION X-RAY APPARATUS

it is unwise to attempt to entirely avoid glycosuria. It is much more important to nourish the little patients back to a good weight and strength and to guard them against the danger of acidosis, apparently this may be accomplished very satisfactorily despite a persistent low grade glycosuria."

This and the following quotations are taken from Volume 6 of MINNESOTA MEDICINE, 1923:

Dr. A. W. Abbott speaking before the Minneapolis Surgical Society, said: "After holding the horse and prescribing castor oil for the axles of my preceptor's two-wheeled chaise for a year, and then attending lectures and witnessing operations for six months, I regret to say that, as evidenced by my diploma, I was certified by my teachers as qualified to challenge all human diseases and to welcome newborn innocence to this sinful world. I had my own doubts about this and so had many of the good people on whom I tried it. An internship in a hospital eased my conscience somewhat."

In the same article, Abbott described surgery of a century ago: "Before anesthesia, patients only half asleep with opium disliked long operations. Naturally, the older surgeons had cultivated speed. It saved blood and pain. Come back with me before 1870 to the old operating room in Bellevue Hospital in New York. The operation is to be an amputation of the thigh. The students are sitting around the room, leaving a space about ten feet square for the operation and betting on the probable time the operation would take. The patient is brought in, his night shirt is pulled up out of the way, his legs project from the end of the table, an attendant holds up each stockinged foot. The professor, in dress suit and spotless cuffs, breezes in, the watches of the students come out. (Here I want to assure you that the history of the case, the pathology, the anatomy were clearly and concisely stated.) The tourniquet is applied, an assistant grasps the thigh, the surgeon picks up the long catlin,* he reaches under and over the limb, the time is taken, there is a convulsive shrinking of the patient as the catlin whirls around the thigh reaching the bone in

one sweep, and then, flung to the floor, stands quivering with its point fast in the wood. The retracting bandage is applied, the saw grates through the bone, the attendant drops the leg, the students cheer, the professor bows and the time is in dispute as to twenty-one or twenty-two seconds."

— x —

CPC

"On December 6, 1921 I was called to see S.W., aged three and one-half years. The patient had been under our observation for the preceding year as a normal child. At about 4 P.M. the mother reported by telephone from a downtown store that she had noticed the child's lips were blue. Thinking the child might be having a chill we advised the mother to take her home, put her to bed, and keep her warm. This the mother did, but the discoloration had increased to such a degree that the mother became alarmed and called me at 8 P.M.

"The appearance of the child was most striking: the face, mucous membranes, hands and feet were deeply cyanosed, almost black, yet the little patient did not appear distressed and was mentally clear. The temperature was normal. The first impression was that of an acute heart failure. The pulse, however, was of good quality, regular, rate about 140. There was no evidence of enlargement of the heart and auscultation was negative except for a faint, systolic murmur over the base."†

— x —

"Minneapolis did not quite make \$1,000,000 on a quota of \$1,130,000 [1922 campaign for the Community Chest.] And Duluth fell a little short of its quota of \$250,000. In St. Paul the goal of \$675,000 was set and \$561,000 pledged."

— x —

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— x —

Book Review

"THE FEMALE IMPERSONATORS. Ralph Werter-Jennie June (Earl Lind), 295 pages. Medico-Legal Journal, 1922.

"Our modest author has appointed himself the spokesman and defender of the "third sex." The

*A long straight, sharp, double-edged knife used in amputations (Dorland's).

†F. C. Rodda, a Minneapolis pediatrician published this case report in an article entitled "Nitrobenzol Poisoning in Children." This three and a half year old patient had worn newly dyed, heavy, buckskin shoes the day of her attack and recovered completely in 24 hours.

book is ostensibly a plea for toleration toward homosexualists or bisexualists as the author prefers to term them. The fact that he himself boasts of belonging to this class of mental cripples makes it an open question whether his motive in writing the book is not rather to appease his appetite for admiration and to recall the pleasant memories of his conquests in the character of Ralph-Jennie, the "Faerie" charmer."

— x —

Volume 6 of MINNESOTA MEDICINE in 1923 published many case reports that were presented before various small medical societies. The articles are of particular interest because of the discussions quoted at length with such people as

A. C. Strachauer, Robert Emmett Farr, Arnold Schwyzer, A. W. Adson, F. P. V. Foley and H. B. Sweetser, frequently rising to discuss the papers.

Those of you who are surprised to find the name of one of our golden honorees just out of medical school in 1923, included among discussers should be reminded that the H. B. Sweetser who is quoted is the father of the current H. B. Sweetser.

Most of our 18 golden anniversary honorees are now retired from active medical work. MINNESOTA MEDICINE recognizes their achievements reaching par in medical practice in 1973 and wishes them all well throughout all their future years.

Reuben Berman, M.D.
Editor

Infectious Complications following Legal Abortion

THE ARTICLE by Gaziano and Kaplan* brings to our attention the fact that elective abortion is not an innocuous procedure. Most of the abortions seen in Minnesota during the interval under study were performed elsewhere. Most apparently were performed under ideal medical conditions and, therefore, should have been uncomplicated. As is seen, this was not the case. Since

abortion is likely to be more freely available in Minnesota in the future, centers in which this procedure is to be carried out must be very sure that the liaison with the referring doctor is intact. If there is no referring doctor, a follow-up should be arranged and specific instructions which are fully understood be given to the patient in this regard.

Reginald A. Smith, M.D.
Rochester, Minnesota

*Gaziano E and Kaplan EL: Infectious complications following legal abortion. Minnesota Med 56:4:269, 1973.

Donlin Long, M.D.

Dr. Donlin Long, associate professor neurosurgery at the University of Minnesota, became professor and head of neurosurgery at Johns Hopkins University, Baltimore, Maryland, July 1.

Dr. Donald Erickson, assistant professor and chief of neurosurgery at St. Paul Ramsey Hospital, became a full-time faculty member at University Hospitals.

Hiatal Hernioplasty—Scleroderma

THE BELSEY MARK IV hiatal hernioplasty has been highly successful in correcting esophageal reflux in patients with hiatal hernia. This repair reduces the gastroesophageal junction to its normal infradiaphragmatic position and plicates the stomach around the distal esophagus.

Lindberg, et al.* report a case of scleroderma with esophageal mobility disturbance and hiatal hernia, repaired by the Belsey Mark IV hiatal hernioplasty. Clinical results, as should be expected, were excellent. The presence of sclero-

derma in a patient with esophageal hiatal hernia is certainly not a contraindication hernia repair and indeed makes repair of this physiologic disturbance even more urgent. Continued esophageal reflux and erosion results eventually in cicatrix and severe esophageal stricture with its attendant morbidity. It is to be hoped that patients with severe and symptomatic esophageal reflux would not be allowed to progress to the state of esophageal cicatrix and stenosis but would be afforded the relief of a more normal gastroesophageal junction.

Theodore A. Peterson, M.D.
Minneapolis, Minnesota

*See page 643.

Fate of the Abandoned Bladder

THE REPORT ON THE fate of the abandoned bladder by Drs. Campbell, DeWeerd and Utz,* citing their experiences with fifty patients over a period of three years is most timely. The apparent increase in the number of patients with neurogenic vesical dysfunction and others for whom the solution of their voiding problem is best provided by urinary diversion has directed attention to complications resulting from the disused bladder. In the series recorded, only four bladders required removal, but none because of pyocystis. In a previous report by the Mayo Clinic group it is noted that ten percent of the patients in their pediatric series required cystectomy because of infection. Another recent series review by Drs. Stewart, Cass and Ireland described their experience with sixty children in whom four of fifteen developed infections in abandoned bladders and required cystectomy. They found the use of .25% silver nitrate solution of value for irrigating of the infected bladders.

Our experience with this problem has been

confined to patients with neurogenic dysfunction, two of whom were children. Six of sixteen required cystectomy because of infection. Several more have had pyocystis treated with lavage and antibiotics to resolution. Removal of the bladder was necessitated not so much by infection as by the dysreflexia which occurred during irrigation, mostly among quadriplegics. The resultant spasms, extreme headaches, hypertension, and severe sweating were unbearable to these patients and all welcomed the relief gained from simple cystectomy. All had had indwelling urethra catheters in place prior to their urinary diversion. Their problems from pyocystis—fever, increased spasms and foul urethral discharge—were not apparent for several months after diversion. We have been impressed by the seeming freedom from symptoms among patients whose bladder outlets were not obstructed, or whose neurogenic disease allowed the bladders to empty the accumulated “bladder mucus” spontaneously.

William L. Engel, M.D.
Minneapolis, Minnesota

*See page 603.

Philosophical Musings of a Surgeon

Oh, for the good old days when a man could make an honest 20¢ an hour and sleep!—Carl O. Rice, M.D., Ph.D.

Congenital Anomalies of Upper Urinary Tract

MANY PEDIATRIC HOSPITAL admissions are for the evaluation and treatment of urological problems. Anomalies of the bladder and urethra are more common but a significant number involve abnormalities of the upper tract.

Ghosh, Farrow and Furlow in their article, *Congenital Anomalies of the Upper Urinary Tract** have described the developmental anatomy and classified the major abnormalities. Early clinical diagnosis of these abnormalities with the implied prevention of irreversible damage is the responsibility of the pediatrician.

Diagnosis begins with the counting of the umbilical arteries and the observation of the urinary

stream of the newborn. Part of the physical examination of the newborn is palpation of the renal tissue. Evaluation of jaundice, fever, irritability or anorexia of the newborn must include studies of the urinary tract. Infant and children with an unexplained fever should have urine cultures. The urinalysis is an important part of the periodic health examination. Any child with hypertension should have an evaluation of renal arteries.

Some of the anomalies described are incompatible with long life, but the early recognition of many of these can prevent progressive damage to the renal system.

C. Sherman Hoyt, M.D.
Minneapolis, Minnesota

*Page 637.

Acute Suppurative Thyroiditis

THE RARE OCCURRENCE of acute suppurative thyroiditis is pointed out by Olin et al.,* in this issue. Reviewing records by discharge diagnosis in two hospitals the writer is associated with, one for five years, one for 10 years, and representing approximately 150,000 patients, failed to reveal one such diagnosis. Although the article includes reports of two cases unrelated except they demonstrated suppurative processes in the thyroid gland, it points up several interesting aspects of infectious thyroid disease.

The relation of the thyroid gland to the oropharynx is supported by its embryologic development from the floor of the pharynx in the area near or at the base of the tongue. The lymphatic drainage of the thyroid relates to the internal jugular chain, pretracheal and retropharyngeal nodes, again indicating its retained relationship to the oropharynx. This may explain suppurative thyroid disease arising from a focus in the oropharynx.

In the pre-antibiotic era, suppurative thyroiditis was somewhat more common and the offending organisms most commonly included streptococci,

staphylococci and pneumococci. Dr. Arnold S. Jackson, in discussing this problem, stated: "... purulent thyroiditis has decreased as empyema and otitis have decreased. I think that in this chemotherapy era we will expect to see less and less purulent thyroiditis."¹ Time seems to have proved his prediction to be true.

In an inflammatory process with associated necrosis the release of thyroid hormone might be expected but does not seem to be a prominent feature of this disease. Of further interest is the apparent suppression of I^{131} uptake reported in the two cases referred to above.

Although the symptoms may be acute and severe, the duration of the process varies from days to several weeks, suggesting that the disease process more appropriately might be called "suppurative thyroiditis" or "thyroid abscess."

It appears that this disease will be seen occasionally and its management should be that related to control the inflammatory process with the use of appropriate bacteriologic studies, antibiotics, and surgery.

Robert D. Blomberg, M.D.
Minneapolis, Minnesota

*See page 586.

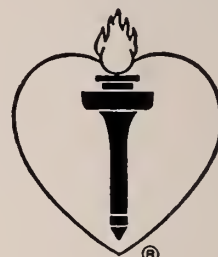
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1. Altmeier WA: Acute pyogenic thyroiditis. Arch Surg 61:76. 1950.

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Femoral Neck Fractures

THIS STUDY* SETS out to show "that prosthetic replacement for acute fractures of the femoral neck has been a satisfactory treatment" at General Hospital. It is recognized, however, by the authors that prosthetic replacement is a procedure of somewhat greater magnitude than internal fixation for an intra-capsular fracture. The mortality rate and the infection rate are thought to be higher although no specific comparison figures are reported here. The infection rate is not quite clear from the data available. There apparently were 16 infections overall and, if based on the 144 acute fractures, it would appear this is in the range of 11 percent.

Selection of prosthetic replacement rather than internal fixation is usually based on the idea that the patient can be ambulated with full weight-bearing more quickly and easily on the prosthesis. No data is presented regarding the average time after surgery that the patients were able to ambulate. This, of course, would have a bearing on the rate of the serious complication of pneumonia, pulmonary emboli, thrombophlebitis, and

perhaps even CVA and myocardial infarction.

The authors state that their present program is to internally fix hip fractures within the first 24 hours regardless of the patient's age and to reserve prostheses for acute fractures with special problems. That this is a reasonable conclusion from this study has to be no more than an impression since no comparison with hip nailing over the same nine-year period is presented. On the other hand, as stated by the authors, prosthetic replacement is a procedure of less magnitude than *total* hip replacement as a treatment for acute fractures in the elderly patient.

A good attempt to grade and analyze function in patients who have had prostheses has been made. It is quite difficult to do so since so much of the hip fracture patient's function depends on factors other than the injury and the surgery. These include age, strength, general health, disposition, and cerebral function.

Overall, the study indicates that prosthetic replacement can be expected to provide pain relief with reasonably good function, but with a relatively high complication rate.

Joseph M. Tambornino, M.D.
Minneapolis, Minnesota

*Moore, R.H. et al.: Femoral Neck Fractures. Analysis of Hip, Prosthetic Replacements, Hennepin County General Hospital, Minnesota Med 56:5:358, 1973

Testicular Tumors

THE MOST DISTRESSING aspect of the diagnosis and treatment of testicular tumors is the fact that so many of these malignancies are not immediately recognized as such by the patient's physician. In a disease where early diagnosis and treatment are the keystones for successful outcome, early referral for urologic evaluation is mandatory for any testicular lesion of whose benign character the physician is not certain.

The question of biopsy of testicular lesions is discussed in detail by Fraley, Markland and Medina.* One would perhaps supplement their discussion by saying that the occasions when one would biopsy a suspicious malignant lesion of the testicle are few and far between. It is probably preferable that diagnosis should be made with

the entire specimen in the surgical pathologist's laboratory when there is a strong clinical suspicion of cancer.

Treatment of testicular tumor requires the services of several disciplines and, as such, after the initial radical orchiectomy, treatment is best handled at a medical center. The precise roles of lymphadenectomy and of chemotherapy in the treatment of non-seminomatous and germinal cell cancer remain to be settled.

Major increases in survival rates for patients with these diseases may come through more effective chemotherapy in concert with lymphadenectomy, but significant improvement can come, now, through early identification by patient and physician.

Joseph W. Segura, M.D.
Mayo Clinic

*See page 593.

Clinical Significance of Antibodies to Polynucleotides

DR. A. L. Fox* has well summarized current opinion about the diagnostic usefulness of antinuclear antibodies. He emphasizes the particular value of testing for antibody to double stranded (ds or native) DNA because this antibody is seldom found in significant titer in diseases other than SLE. The ability to produce this antibody must somehow be related to the pathogenesis of SLE. Whereas under appropriate conditions of immunization it is possible to produce antibodies to single stranded (denatured) DNA in experimental animals, it has not been possible to promote the production of anti double stranded DNA. The only other known disease accompanied by a high frequency of this antibody is the spontaneous renal disease of New Zealand Black (NZB) mice which closely resembles SLE and has been used as an animal model for studying this disease.¹ Antibody to single stranded DNA is of little diagnostic help as Fox points out and could be eliminated from the clinical laboratory without being missed.

Attention has recently been focussed on antinuclear antibodies other than those against DNA and DNP. The term ENA (for "extractable nuclear antigen") was coined by H. R. Holman, G. C. Sharp and their associates to refer to an antigen extractable from nuclei by physiological salt solutions which do not remove DNA.² This material is now known to contain at least two antigens, both responsible for speckled staining of nuclei by the immunofluorescent technique. One of these is a protein first isolated from

nuclei by Tan and Kunkel.³ Antibody to it occurs in up to 50% of patients with SLE. It does not appear to be closely related to the pathogenesis of the disease. Antibody to the other ENA represents antibody to ribonucleoprotein (RNP) since treatment of ENA with ribonuclease destroys its ability to detect this antibody.⁴ It has most commonly been associated with a syndrome characterized by features of scleroderma, polymyositis and SLE. Like other antinuclear antibodies it is not specific for this entity nor is it always present in patients with the clinical picture of the mixed connective disease syndrome. The anti-RNP titers in such patients are usually very high (1:100,000 or so) and do not fluctuate greatly with disease activity. The relationship of anti-RNP to disease is at present only beginning to be explored. Antibodies to double stranded RNA have been identified in the sera of 50% of patients with SLE. Since double stranded RNA does not occur in mammalian cells but is found in certain viruses, especially during multiplication, this finding has been put forward as evidence for the possible role of virus infection in this disease.⁵

Thus, characterization of antinuclear antibodies has provided not only a useful laboratory tool for the classification and management of the connective tissue disease but also a valuable lead for the investigation of the pathogenesis of these perplexing illnesses.

Frederic C. McDuffie, M.D.
Mayo Clinic

*See page 589.

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He is a bold man who submits his paper for publication without it having first been put under the microscope of friendly criticism by colleagues.—W. I. B. Beveridge (1908-)

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The recommended nursing technique is without deviation, this procedure can show visible improvement within 48 hours of application. If no dissolution of slough occurs by then, continuation is unlikely to be rewarding. A break in procedure, usually due to use of drying or antiseptic agents which impair the effectiveness of the enzyme in TRAVASE).

Observation and photos by Kathleen Brough
D., Marion County Home, Indianapolis, Ind.

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Thoroughly cleanse and irrigate the wound area using only sterile water or sodium chloride solution. Be sure to cleanse the wound of any antiseptics or heavy-metal antibacterial agents which may interfere with the enzyme activity.

Thoroughly soak the wound area. Where practical, tubbing or showering is suitable. Or wet soaks with gauze pads may be used. Remember to avoid chemical cleansing agents which may interfere with the therapy.

With a sterile cotton swab or finger cot, apply a very thin layer of TRAVASE Ointment. The ointment spreads easily and only a small amount is needed (a small dab of ointment will cover an area as big as the back of a hand).

Be sure, though, to rub the ointment well into every crack or crevice of the wound and overlap the surrounding skin one-fourth to one-half inch beyond the area to be debrided—to be sure of complete coverage.



Apply loose, wet dressings, thoroughly soaked in sodium chloride solution or sterile water to the area to be debrided only.

Cover the moist dressings with an occlusive wrap (Saran wrap, Telfa Pads, or other plastic wrappings) to keep wound site moist. Do not extend occlusive wrap over ½ inch beyond area to be debrided.

When changing dressing, gently wipe away the dissolved material. Repeat the complete dressing procedure, including application of TRAVASE Ointment, four times daily.

The ulcer shown in these photos is simulated on a model in order to demonstrate the correct TRAVASE application technique.

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ACTION: TRAVASE Ointment selectively digests necrotic soft tissue, dissolving and facilitating the removal of necrotic tissues and purulent exudates that otherwise impair formation of granulation tissue and delay wound healing (4).

At body temperatures these proteolytic enzymes have optimal activity in the pH range from 6.0 to 6.8.

INDICATIONS: For wound debridement (1,2)—TRAVASE Ointment is indicated as an adjunct to established methods of wound care or biochemical debridement of the following lesions:

- Second and third degree burns,
- Decubitus ulcers,
- Incisional, traumatic, and pyogenic wounds,
- Ulcers secondary to peripheral vascular disease.

CONTRAINDICATIONS: Application of TRAVASE (brand of sutilains) Ointment is contraindicated in the following conditions:

- Wounds communicating with major body cavities,
- Wounds containing exposed major nerves or nervous tissue,
- Fungating neoplastic ulcers,
- Wounds in women of child-bearing potential—because of laboratory evidence of effects of TRAVASE upon the developing fetus.

WARNING: Do not permit TRAVASE Ointment to come into contact with the eyes. In treatment of burns or lesions about the head or face, the ointment inadvertently come into contact with the eyes, it should be immediately rinsed with copious amounts of water, preferably with sterile saline.

PRECAUTIONS: A moist environment is essential to optimal enzyme activity. Enzyme activity may also be impaired by certain antiseptics and detergents (benzalkonium chloride, hexachlorophene, iodine, and nitrofurazone) may render the ointment ineffective to the action of the enzyme (3). Compounds such as containing metallic ions interfere directly with enzyme activity, whereas neomycin, sulfamylon-streptomycin, and do not affect enzyme activity. In cases where adjunctive topical therapy has been used and no dissolution of slough occurs after treatment with TRAVASE Ointment for 24 to 48 hours, further application, but interference by the adjunctive agents, is unlikely to be rewarding.

In cases where there is existent or threatening invasive infection, appropriate systemic antibiotic therapy should be instituted.

Although there have been no reports of systemic allergic reactions in humans, studies have shown that there may be an antibody response in humans to absorbed enzyme material.

ADVERSE REACTIONS: Adverse reactions consist of mild, transient pruritus, bleeding and transient dermatitis. Pain usually controlled by administration of mild analgesics. Side effects are enough to warrant discontinuation of therapy occasionally have been reported.

If bleeding or dermatitis occurs as a result of the application (brand of sutilains) Ointment, therapy should be discontinued. Toxicity has been observed as a result of the topical application of TRAVASE Ointment.

Dosage and Administration

STRICT ADHERENCE TO THE FOLLOWING IS REQUIRED FOR OPTIMAL RESULTS OF TREATMENT

1. Thoroughly Cleanse and Irrigate Wound Area with sterile water or water solutions. Wound MUST be cleansed of all necrotic debris and heavy-metal antibacterials which may denature enzyme substrate characteristics (e.g., Hexachlorophene, Silver Nitrate, Benzalkonium Chloride, Nitrofurazone, etc.).
2. Thoroughly moisten wound area either through tubbing or wet soaks (e.g., sodium chloride or water solution).
3. Apply TRAVASE Ointment in a thin layer assuring it covers all necrotic tissue and complete wound coverage ¼ to ½ inch beyond the area to be debrided.
4. Apply loose wet dressings.
5. Repeat entire procedure 3 to 4 times per day for best results.

How Supplied

3P3002 TRAVASE Ointment is supplied sterile in one-half ounce (14.2 g.) containing 82,000 casein units of sutilain in a hydrophobic ointment base.

The ointment must be stored under refrigeration at 2° to 10° (35° to 50° F).

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*A casein unit is the amount of enzyme required to produce an optical density at 275 mμ as that of a solution of 1.5 mcg. after the enzyme has been incubated with 35 mg. of casein for one minute.



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Fifty Years of Faithful Service

Ann W. Arnold, M.D.

Dr. Arnold is a member of the American College of Surgeons, specialized in obstetrics and gynecology in the Twin Cities area and headed the staff at Asbury Hospital as its President in the 1940's. During her career, she served as Women's Physician at Macalester College in St. Paul, and in 1956, became President and Chief of the Medical Staff of Ripley Memorial Hospital in Minneapolis. Among the obstetrical and gynecological societies of which she was a member are: the Central Association, American College, and the Minnesota State Association.

Born at Mondovi, Wisconsin, Dr. Arnold obtained her B.A. from the University of Wisconsin in 1919 and earned her M.D. at the Medical College of the University of Pennsylvania in 1921. She interned at Philadelphia General Hospital and did her postgraduate work at Woman's Hospital in New York.

Dr. Arnold is the widow of Dr. Duma C. Arnold, a gynecologist, who practiced medicine in Minneapolis until his death in 1950. The Arnolds' son and daughter entered the medical profession, making this an entire family of physicians.

Orwood J. Campbell, M.D.

A surgeon and member extraordinary of the Minnesota State Medical Association, Dr. Campbell was recipient in 1965 of the Distinguished Service Award for his many years of service to medicine in Minnesota. He began his work as a leader in organized medicine when he became Secretary-Treasurer of the Hennepin County Medical Society in 1944, and its President in 1945-46. After election to the Council of the State Association in 1948, he served as one of Minnesota's representatives to the AMA House of Delegates for 16 years, 1951-67.

Born at Sparta, Illinois, Dr. Campbell attended Bradley Polytechnical Institute in Peoria, took his B.S. degree at the University of Chicago, his M.D. at Rush Medical School in 1923, and interned at Presbyterian Hospital in Chicago. He achieved his Ph.D. at the University of Minnesota in 1933 where he was an Associate Professor of Surgery. In addition to an active practice, Dr. Campbell taught at Minneapolis General Hospital and served for a time as Chief of Surgery.

A Founder member of the American Board of Surgery, Fellow of the American College of Surgeons, a member of Western Surgical Society, the Minnesota Surgical Society, and the Minneapolis Academy of Medicine, he retired from practice in Minnesota in 1971.

See editorial, page 615.

FIFTY YEARS

Philip F. Eckman, M.D.

Dr. Eckman is a native Minnesotan, born in Center City. He has practiced general medicine and surgery in Duluth, Minnesota since 1923 and has served as Chief of Staff of each of Duluth's three hospitals.

A graduate of Gustavus Adolphus College, Dr. Eckman received the Greater Gustavus Award in 1965, after serving as trustee and board chairman during the 1950 decade. He graduated from the University of Minnesota College of Medicine and served internships at Ancker Hospital in St. Paul and at St. Mary's in Duluth. He has been a director of the Minnesota Division of the American Cancer Society since 1953 and was that society's president in 1964-65. In 1947, Governor Youngdahl appointed him to the Minnesota Board of Examiners of Nurses, a post he held during the first three years of the L.P.N. program.

Dr. Eckman is a fellow in the American College of Surgeons, a member of the Minnesota Surgical Society, Duluth Surgical Society and the Duluth-Superior Interurban Academy of Medicine.

Malcolm G. Gillespie, M.D.

Certified by the American Board of Surgery and a Fellow of the American College of Surgeons, Dr. Gillespie practiced as a member of the Duluth Clinic surgical staff all during his medical career. He served on the staff of St. Luke's Hospital, was Chief of Staff at St. Mary's, and a consultant at Miller Memorial Hospital.

While active in the St. Louis County Medical Society, Dr. Gillespie held office as secretary-treasurer and as president. He is a Phi Rho Sigma and Alpha Omega Alpha, a member of the Central Surgical Association, and founder-member of the Society for Surgery of the Alimentary Tract.

He obtained his premedical education at Park College, Parkville, Missouri, and the University of North Dakota, and his M.D. at the University of Minnesota.

Born at Minto, North Dakota, Dr. Gillespie is one of three brothers who became physicians and whose families include three sons and one daughter—all physicians.

Benjamin A. Gingold, M.D.

A practicing surgeon and urologist, Dr. Gingold was born in Duluth, Minnesota and acquired his education at the University of Minnesota. He did postgraduate work in surgery for three years on a fellowship at Minneapolis General where he had interned. Upon completing additional studies at Johns Hopkins University in Baltimore, he returned to Minneapolis to become a staff member at Minneapolis General, Asbury Hospital, and, presently, at Mount Sinai Hospital.

Dr. Gingold is an emeritus staff member of Methodist Hospital. He has a life membership in the Hennepin County Medical Society, the Minnesota State Medical Association and the AMA. Dr. Gingold is a member of the American and the International College of Surgery.

Gaius E. Harmon, M.D.

Dr. Harmon maintains an active practice in St. Paul where he has been a lifelong resident. He earned both his B.S. and M.D. degrees at the University of Minnesota and received that school's coveted "M" award in swimming in 1920 and 1921. After two years of internship at Ancker Hospital, Dr. Harmon began his practice as a general surgeon, joining the staff of St. Joseph's Hospital and serving as chief of staff at Midway Hospital.

For four years, he was president of the St. Paul Hearing and Speech Society and is a member of the St. Paul Surgical Society.

Dr. Harmon has been a member of the Minnesota State Medical Association for forty-eight years.

FIFTY YEARS

William W. Heck, M.D.

A general practitioner and graduate of the University of Minnesota Medical School, Dr. Heck began his career as a surgical assistant. Since 1933 he has engaged in solo practice, devoting considerable portions of his time to industrial surgery and medicine. Premedical education was obtained at the College of St. Thomas and he interned at Ancker Hospital in St. Paul. Following a twelve-month rotating internship, Dr. Heck fulfilled a one-year residency in surgery in the same hospital.

He served as chief of staff at both Ancker and St. Joseph's Hospital in St. Paul, was Vice President of the Ramsey County Medical Society, and holds a life membership in the Minnesota State Medical Association.

Louis P. Hiniker, M.D.

Dr. Hiniker practiced in St. Paul during his entire career except for a brief period of time in 1923 which he spent in Belle Plaine, Minnesota. Born in Hastings, he attended the College of St. Thomas in St. Paul for his premed education. He graduated from the University of Minnesota Medical School in 1924 and served his internship at St. Mary's Hospital in Minneapolis.

After the death of his wife in 1932, Dr. Hiniker went on to rear his two children and continue his active practice until 1967 when he retired. He has been a member of the Minnesota State Medical Association for forty-four years.

John E. Holt, M.D.

An internist, with an active practice in St. Paul, Dr. Holt was born in Minneapolis and earned his B.S. and M.D. degrees at the University of Minnesota. He spent his internship at two New York City hospitals, four months at Willard Parker Hospital in the study of contagious diseases, and two years at New York Hospital. Under a Mayo Clinic Teaching Fellowship, Dr. Holt was a resident in medicine at the University Hospital in 1925-26.

He holds the Certificate of Merit as Clinical Assistant Professor of Internal Medicine in the College of Medical Sciences for service to the University and the State of Minnesota in 1925-26 and from 1932 to 1967.

Walter H. Judd, M.D.

After years as a medical missionary in China, Dr. Judd entered politics and won election to Congress in 1942 as a representative from Minnesota's Fifth Congressional District. By popular vote, he returned to Congress for each succeeding term until 1962. Dr. Judd occupies a position of great respect in Washington where he continues to be influential in the nation's affairs. Currently, he is president of the Former Members of Congress Organization.

He is a native son of Nebraska where he graduated from the University of Nebraska Medical School. For 17 months, he interned at the University Hospital in Omaha and did postgraduate work for 27 months at the Mayo Foundation in Rochester.

Dr. Judd has been the recipient of many honors and well-deserved recognition during his colorful, dynamic career. He presently serves as chairman of the Judicial Council of the American Medical Association and is a contributing editor of *Reader's Digest*.

FIFTY YEARS

James W. Kernohan, M.D.

Emeritus staff member at Mayo Clinic, Dr. Kernohan retired in 1962. During his active career, he headed the Experimental and Anatomic Pathology section and was Professor of Pathology for the University of Minnesota Mayo Foundation Graduate School at Rochester.

County Antrim, Ireland, is the birthplace of Dr. Kernohan and his education was obtained at Queen's University of Belfast, North Ireland.

In 1966, that University bestowed upon him the honorary degree of Doctor of Science.

A licensed physician in Minnesota since 1923, Dr. Kernohan became a naturalized citizen of the United States in 1938.

Abraham B. Rosenfield, M.D.

Public health specialist, Dr. Rosenfield joined the staff of the Minnesota Department of Health in 1947 and, within a short time, became Director of the Division of Special Services. That same year, he accepted appointment to the Committee on Obstetrics, Gynecology and Maternal Health (then the Committee on Maternal Health) and played an important role in the development of the Minnesota State Medical Association's unique Maternal Mortality Study Program. He represented the Health Department in the conduct of the program and is still an active committee member.

For many years, he was chairman of the Home Safety Section of the Minnesota Safety Council and continues to serve on the Home Conference Committee of the National Safety Council. Dr. Rosenfield was president of the Minnesota Public Health Association in 1960 and received the Albert J. Chesley Award in Public Health in 1967. From 1967-70 he served as a member of the Minneapolis Board of Public Welfare.

After receiving his M.D. and M.P.H. degrees at the University of Minnesota, he studied for a brief time at Children's Memorial Hospital in Chicago and interned at Minneapolis General Hospital. Dr. Rosenfield practiced at Pequot Lakes from 1924 until 1937, when he accepted the position as School Physician for Hibbing, Minnesota Public Schools.

Benjamin B. Souster, M.D.

Dr. Souster served the Minnesota State Medical Association as secretary for 19 years. In 1958, the Association named him president-elect, and the next year he became president.

A native of St. Paul, he attended Hamline University and obtained his medical training at the University of Minnesota. Upon completing his internship at Ancker Hospital, he became an Assistant in Medicine and a member of the staff there.

Dr. Souster was electrocardiologist and Chief of Staff at Midway Hospital in 1959 and a staff physician at two other St. Paul hospitals, Mounds Park and Miller. During World War I he did his tour of duty with the Minnesota Base Hospital Number 26.

An internist, he was with the Earl Clinic in St. Paul for ten years before establishing his still-active private practice in 1936. Dr. Souster is a Fellow of the American College of Physicians and an Alpha Omega Alpha.

Alf K. Stratte, M.D.

Dr. Stratte practiced medicine in Pine City and gave a total of 28 years of service to the United States as Medical Officer in the Pine City unit of the Minnesota National Guard. He was a two-year veteran of World War I and a five-year veteran of World War II.

A graduate of Carleton College in Northfield and the University of Minnesota Medical School, Dr. Stratte served a rotating internship at St. Francis Hospital in Pittsburgh, Pennsylvania, and at the Northern Pacific Hospital in St. Paul. He holds a life membership in the Minnesota State Medical Association since 1966.

FIFTY YEARS

Horatio B. Sweetser, M.D.

Dr. Sweetser is an internist and member of a distinguished family of doctors. An active member of the Minnesota State Medical Association, he was councilor of the Sixth District from 1953 until 1958 when he assumed the presidency of the Association. As a member of the Association's important liaison committee, he was instrumental in forming the recommendations adopted by the 1963 Legislature which provided for amended licensure for osteopaths in Minnesota.

During his term as president, Dr. Sweetser became well-known as a spokesman for medicine. After four years of service, he left the Navy as a Captain and is a retired University of Minnesota Clinical Associate Professor of Medicine. In 1967, the governor appointed him to the State Board of Health.

A 1921 Harvard graduate and son of a surgeon, he practiced in association with his brother and nephew in Minneapolis for many years.

He has been active in the Minneapolis and Minnesota Societies of Internal Medicine and in the Hennepin County Medical Society. Since 1924, Dr. Sweetser has held most of the important staff positions, particularly at St. Mary's Hospital where, in 1970, he added to his duties, the directorship of the Extended Care Center, a facility he had envisioned and worked to achieve.

Joseph H. Taylor, M.D.

A Minneapolis internist who retired in 1964, Dr. Taylor is a graduate of the University of Michigan Medical School where he was a member of Alpha Omega Alpha and Phi Beta Pi.

He interned at the University of Minnesota Hospitals in Minneapolis, was an affiliate of the Nicollet Clinic and on the staff of three Minneapolis hospitals, Abbot, Eitel, and Northwestern's visiting staff.

Since 1924, he has been a member of the Hennepin County Medical Society and the Minnesota State Medical Association.

Macnider Wetherby, M.D.

A specialist in internal medicine, native of Minneapolis, and graduate of the University of Minnesota Medical School, Dr. Wetherby is a Diplomate of the American Board of Internal Medicine. He interned at St. Mary's Hospital in Duluth and studied on a fellowship at the University of Minnesota where he was an Associate Professor of Medicine, and at the Mayo Clinic in Rochester. As well as serving at the University Hospital, he was a staff member at Asbury Hospital.

Dr. Wetherby has been a member of the Hennepin County Medical Society and the Minnesota State Medical Association since 1927.

Rolland H. Wilson, M.D.

Dr. Wilson was president of the Minnesota State Medical Association in 1956 and a member for 30 years of the Association's House of Delegates. He was an alternate delegate to the AMA in 1957-58 and worked on several of the State Association's committees during his many years of active contribution.

Throughout his long career, Dr. Wilson had maintained an interest in public welfare and was a member of the first Statewide Medical Advisory Committee to the Department of Public Welfare. He served in that capacity for 20 years and headed Winona's Department of Health from 1950 to 1960.

Born in Dakota, Minnesota, the son of a pioneer Minnesota doctor, he spent 34 continuous years of practice in the City of Winona where his son, Louis, was his associate for a number of years.

A graduate of the University of Minnesota Medical School, Dr. Wilson practiced at Harmony, Minnesota, for five years before returning to the University for a year of graduate study in surgery and gynecology. He retired from active practice in 1964.

Letter to the Editor

In reading your piece entitled, "Bones, Backs and Braces" in the May, 1973 issue of MINNESOTA MEDICINE,* I was astounded to note that, "Moe's aggressive therapy for increasing spinal deformity is an example of remarkable change in therapeutic approach." And here we have been deluded into thinking all of these years that all efforts should be directed toward decreasing spinal deformity!

Page 409

Milton Abramson, M.D.
Minneapolis, Minnesota

The Editor replies:

At the risk of attempting to defend the indefensible, I will try to point out to you that it is possible to discuss therapy for pneumonia and one wouldn't assume that the therapy was to produce pneumonia, but rather to relieve it. Thus, therapy for a condition of the back in which the deformity is increasing must be therapy to decrease it. I will write it "Moe's aggressive therapy for: The condition in which spinal deformity is in the natural course of events increasing, but the therapy is going to decrease this increasing spinal deformity and we are going to decrease it aggressively in fact, quite suddenly."

As you see, the expression becomes difficult.

Two Physicians Honored

Dr. Glenn J. Mouritsen and Dr. L. A. Syverson have received commendations for outstanding medical services from the board of trustees and the medical staff of Lake Region Hospital.

Dr. Mouritsen, who has served the hospital's medical staff since 1953, was cited for his time and effort in establishing a program of scientific discussions known as Medical Grand Rounds which he has maintained on a weekly basis for the past four years.

Dr. Syverson, a member of the medical staff since 1958, received recognition for serving as coordinator for the Rural Physicians Program being carried out by the University of Minnesota. He has supervised the program in Fergus Falls for the past two years.

Infectious Diseases

Group B Streptococcal Meningitis in Adults

BARRY J. WOLSTAN, B.A.*

MENINGITIS CAUSED by group B streptococcus is rare. There are only five previously reported cases of group B streptococcal meningitis in adults. These include one case in a diabetic with a skin ulcer.¹ Two cases were postoperative infections,^{2,3} one complicating a laminectomy. The other two cases were associated with brain abscess.⁴ Only one of the previous cases was reported after 1947.

Two cases are reported. The first is unique as group B streptococcal meningitis had not previously been reported as a post-partum sequela in the mother. The second case is similar to one reported in 1965¹ as it involved a diabetic with gangrene of an extremity.

Case Reports

Case 1

A 28-year-old healthy gravida 1 para 1 delivered a normal female infant in a rural Minnesota hospital on January 12, 1971. Her prenatal course and 90 minute labor were uncomplicated. Delivery was spontaneous under transvaginal pudendal block anesthesia. Her post-partum course was uneventful for 45 hours when she developed acute onset of intense headache and photophobia followed in two hours by nuchal rigidity. A lumbar puncture revealed cloudy cerebrospinal fluid with 7400 WBC and a protein of 285 mgm %. Peripheral blood showed 10,700 WBC with 84% neutrophils. She received no drug therapy.

The patient was transferred to the University of Minnesota hospital five hours after the onset of symptoms. Significant physical findings on admission were stupor and a temperature of 103°. Her feet were cold and mottled. Nuchal rigidity was present and she had a positive Kernig's sign. Deep tendon reflexes were hyperactive without clonus. A second lumbar puncture was performed. Emergency treatment included 1 gm. cortisol, 250 cc. plasmanate, and 4 gms. ampicillin, all intravenously.

Spinal fluid examination disclosed 8300 WBC with 96% neutrophils, protein 429 mgm %, and glucose 25 mgm %. A gram stain of the fluid showed a sparse number of gram positive cocci. Blood count was 14,400 WBC with 90% neutrophils. After transfer to the intensive care unit, further intravenous antibiotic therapy was begun with 24 million units penicillin/day and 8 gm. methicillin/day. The patient's temperature dropped to 100° within two hours and she was alert and complaining of headache 12 hours after the institution of therapy.

Culture of the cerebrospinal fluid disclosed non-group A beta hemolytic streptococci, and a precipitin test classified the organism as group B. The blood and urine admission cultures showed no growth and throat culture grew no beta hemolytic streptococci. When the organism had been identified as a streptococcus sensitive to penicillin, methicillin was discontinued. Penicillin was continued at 24 million units/day for seven days at which time the dose was decreased to 12 million units/day. The patient continued to improve. Repeat spinal fluid examination four days after admission showed clear fluid with 170 WBC, glucose 46 mgm %, and protein 56 mgm %. Culture revealed no growth.

Antibiotics were discontinued on the 13th hospital day and the patient was discharged on January 28, 1971, fourteen days after the onset of meningitis. Cultures of the newborn infant were negative as were throat cultures from the patient's husband and other daughter.

Case 2

On February 2, 1971, a 73-year-old comatose Mexican American woman was seen in the emergency room of the University Hospital of San Diego County. She had mild diabetes for 20 years controlled on oral agents. Four weeks prior to admission increasing glycosuria was noted and one week prior to admission she became increasingly disoriented. She had been hospitalized 18 months previously for pulmonary tuberculosis and was treated with INH.

Her temperature was 100.6° rectally. On physical examination she was obtunded but grimaced to painful stimuli. She had bilateral cataracts and a gangrenous left foot. Blood glucose was 625 mgm % and BUN 61 mgm %. Hematocrit was 35% with WBC 8800.

Insulin and fluid therapy were instituted and 10 hours after admission the blood glucose was 455 mgm % and acetone negative. She began to stir in bed. A lumbar

From the Division of Infectious Diseases, Department of Medicine, University of Minnesota Medical School.

*Fourth year medical student. Current address—Department of Ophthalmology, University of Minnesota Medical School.

puncture was unsuccessfully attempted.

Eighteen hours after admission urinalysis showed few WBC and motile bacilli. She was afebrile but treatment with ampicillin was started for a urinary tract infection.

Twenty-four hours after admission the patient was unresponsive and febrile (103° rectally) without localizing signs. A lumbar puncture was performed and showed: 1000 WBC—all PMN's, 100 RBC, gram positive diplococci, glucose 108 mgm % (blood glucose 342 mgm %), protein 290 mgm %. Ampicillin was discontinued and penicillin 20 million units/day intravenously was started.

Blood and CSF cultures revealed group B beta-hemolytic streptococci. The patient responded well to the treatment and her level of consciousness improved. She was eating four days after the institution of therapy. On the eighth hospital day the patient had an amputation below the knee of her left leg. Four days later *E. Coli* was isolated from a transtracheal aspirate. Penicillin was discontinued and kanamycin was given. She had received penicillin for 11 days.

Repeat lumbar puncture on the 13th hospital day showed no cells, protein 24 mgm %, glucose 85 mgm %. Culture was negative. Although the patient's CSF improved and her amputation was healing well, she remained sluggish and *E. Coli* persisted in the sputum. For the next 30 days the patient had recurrent hypoglycemic and hypotensive episodes. Focal seizures were noted. She also developed a holosystolic murmur consistent with mitral regurgitation on the 30th day. She pursued a downhill course with pneumonia and expired on the 48th day.

At autopsy a recent (two to three weeks) massive brain infarct in the distribution of the left middle cerebral artery was found. There was a focal embolic encephalitis and candida and bacteria were seen in the vegetations. Examination of the heart showed a 1 cm. vegetation on the posterior leaflet of a perforated mitral valve.

Discussion

Group B streptococci were originally isolated from cows with mastitis. Various attempts have been made to determine whether the cow is the reservoir for the organism as found in humans, although some investigators believe that the human and bovine strains are serologically distant.

The most common site of isolation in humans is the genito-urinary tract. In a study of 138 human isolates of group B streptococci by Brown,⁵ 46 (30%) were from the vagina, 32 (22%) were from the urine, and 22 (15%) were from the throat.

Cervicovaginal carriers of the organism are estimated at between 3-6%.^{6,7} Almost all of these women are asymptomatic. The most common infection seen is puerperal sepsis, occurring usually after septic abortion or prolonged rupture

of membranes. As opposed to group A streptococcus, pharyngitis caused by group B streptococcus is rare. The organism is highly sensitive to penicillin and is variously resistant to tetracycline and streptomycin.

Meningitis caused by group B streptococcus is a rare occurrence. The reporting of cases in recent years has been increasing because of cases in infants in the perinatal period.

Case 1 is unique because group B streptococcal meningitis occurring as a postpartum sequela in the mother has not to our knowledge been reported before. It is probable that this patient harbored group B streptococcus in her vagina and that following delivery she developed a transient bacteremia with localization to the meninges. A cervical culture was not obtained from this patient.

It is of note that the patient's blood cultures were negative. There is a lack of information on the incidence of positive blood cultures in postpartum and post-abortion sepsis. Reinartz and Sanford⁸ point out that most of the older studies dealt with cervicovaginal cultures.

Case 2 is similar to one reported by Lazarus and associates¹ in that both patients had sepsis of a foot. The primary source of our patient's infection was not found although a positive blood culture was obtained. The gangrenous foot is a possible source although no direct cultures were taken.

The susceptibility of diabetics to infection by group B streptococcus was documented by Eickhoff et al.⁹ In a one year study period, group B streptococci were isolated from 108 patients. Eight of these patients were diabetics with gangrene of an extremity. Six were female and two were male. The organism was isolated from the wound of seven and the blood of the eighth patient. None of the patients had meningitis.

The organisms isolated from these two cases were both sensitive to penicillin and resistant to tetracycline and streptomycin.

Acknowledgments

I am appreciative of the guidance of Dr. Wesley W. Spink, Regents Professor of Medicine at the University of Minnesota Medical School, in the preparation of this paper. I also wish to thank Dr. A. I. Braude, Professor of Medicine and Pathology at the University of California at San Diego for the data on Case 2.

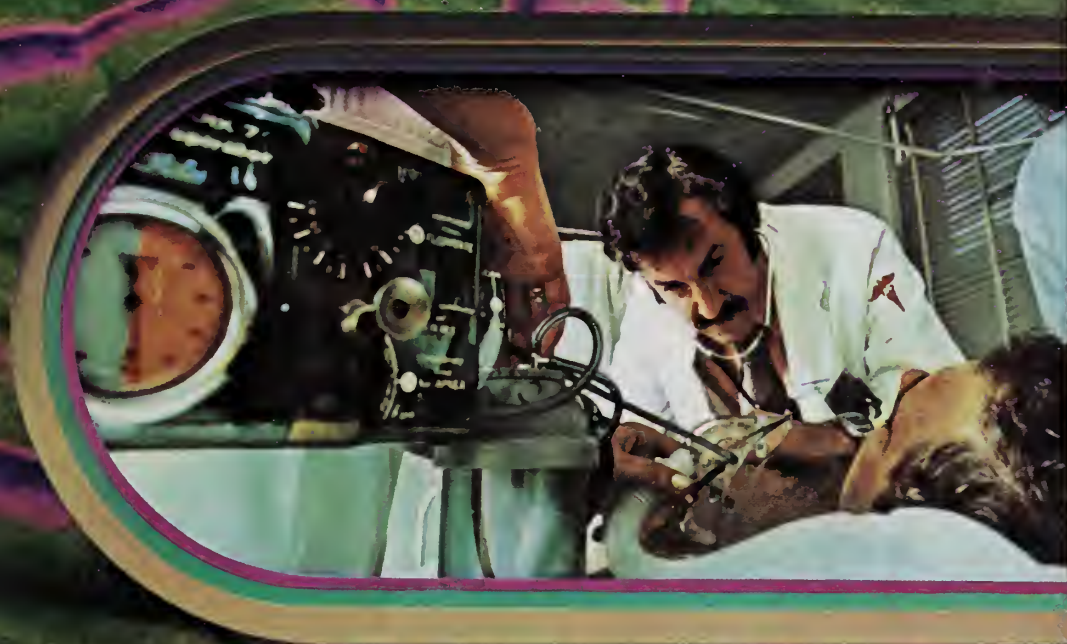
References 1-9 will be found on page 642.

Schering

**On all in-patient
services...**

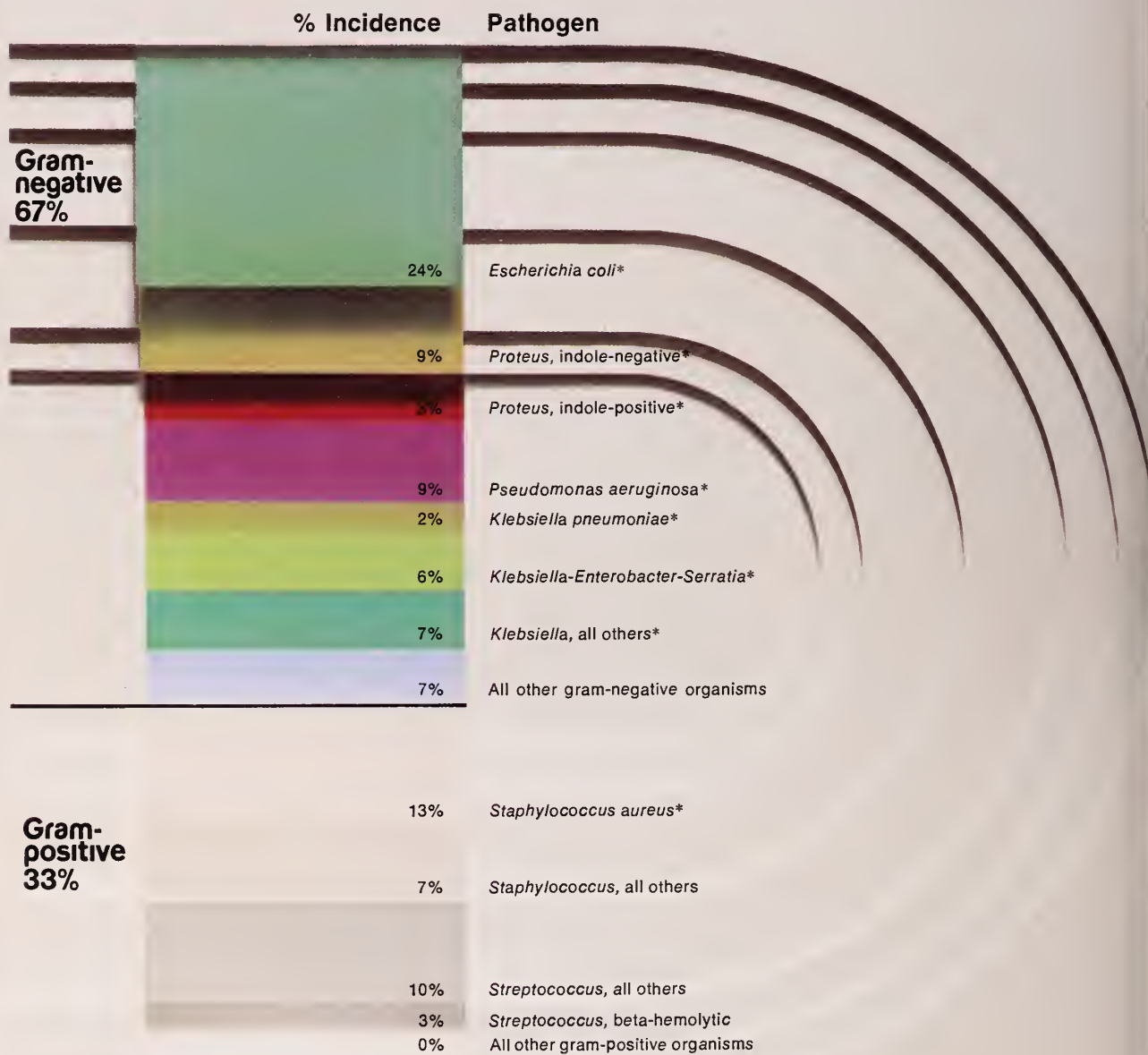
a major problem

**2 out of 3
nosocomial infections
are gram-negative**



Gram-negative bacteria magnified 10,000 times—color-tinted

Commonly encountered pathogens on all hospital services



Total pathogens 21,972
Source: Gosselin Audit of Pathology Cultures—1971

*GARAMYCIN Injectable is effective against susceptible strains of the pathogens indicated.

highly appropriate spectrum for today's problem pathogens

GARAMYCIN Injectable offers a high
ability of effectiveness against susceptible
of seven out of seven major gram-
negative pathogens. These are:

Escherichia coli
Proteus, indole-negative
Proteus, indole-positive
Pseudomonas aeruginosa
Klebsiella
Enterobacter } species
Serratia

GARAMYCIN Injectable has also been shown
effective in serious staphylococcal infec-
It may be considered in those infections
penicillins or other less potentially toxic
are contraindicated and bacterial
susceptibility testing and clinical judgment
rate its use.

Start with Garamycin

■ Broad gram-negative spectrum

Because of its broad gram-negative spectrum and its
well-established clinical efficacy, GARAMYCIN Injectable
can be considered for initial therapy in suspected as
well as documented gram-negative sepsis.

Stay with Garamycin

■ Susceptibility of causative organisms confirmed

The results of susceptibility tests will, in most cases,
demonstrate the causative organisms' sensitivity to
GARAMYCIN Injectable. However, the decision to
continue therapy with this drug should also be based on
the severity of the infection and the important additional
concepts contained in the Warning Box.

■ Relatively low incidence of adverse reactions

Risk of toxic reactions is low in patients with normal
renal function who do not receive GARAMYCIN Injectable
at higher doses or for longer periods of time than
recommended.

■ Bacterial resistance has not been a problem

In the laboratory, resistance has been demonstrated
to develop slowly in stepwise fashion. No one-step
mutations to high resistance have been reported to date.



serious gram-negative infections
pneumonia, urinary tract infections,
septicemia, and wound infections)*
susceptible organisms

On all in-patient
services...

Garamycin[®]
gentamicin **injectable**
sulfate

I.M./I.V.

40 mg. per cc.

Each cc. contains
gentamicin sulfate equivalent
to 40 mg. gentamicin

WARNING

Patients treated with GARAMYCIN Injectable should be
under close clinical observation because of the
potential toxicity associated with the use of this drug.
Ototoxicity, both vestibular and auditory, can occur
in patients, primarily those with pre-existing renal
impairment, treated with GARAMYCIN Injectable, usually
for longer periods or with higher doses than
recommended.

GARAMYCIN Injectable is potentially nephrotoxic,
and this should be kept in mind when it is used in
patients with pre-existing renal impairment.
Monitoring of renal and eighth nerve function is
recommended during therapy of patients with known
impairment of renal function. This testing is also
recommended in patients with normal renal function at
the onset of therapy who develop evidence of nitrogen
retention (increasing BUN, NPN, creatinine or oliguria).
Evidence of ototoxicity requires dosage adjustments

or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal
dialysis or hemodialysis will aid in removal of
gentamicin from the blood.

Serum concentrations should be monitored when
feasible and prolonged concentrations above 12 mcg./
mL. should be avoided.

Concurrent use of other neurotoxic and/or nephro-
toxic drugs, particularly streptomycin, neomycin,
kanamycin, cephaloridine, viomycin, polymyxin B, and
polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent
diuretics should be avoided, since certain diuretics by
themselves may cause ototoxicity. In addition, when
administered intravenously, diuretics may cause a rise
in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy
has not been established.

On all in-patient services...
in hospital-acquired gram-negative infections*

Garamycin®

gentamicin sulfate

Injectable

I.M./I.V.

40 mg. per cc.

Each cc. contains
gentamicin sulfate equivalent
to 40 mg. gentamicin

Also available:

GARAMYCIN® Pediatric Injectable, 10 mg. per cc.

GARAMYCIN® Injectable, brand of gentamicin sulfate U.S.P., injection, 40 mg./cc. Each cc. contains gentamicin sulfate equivalent to 40 mg. gentamicin
For Parenteral Administration

WARNING

Patients treated with GARAMYCIN Injectable should be under close clinical observation because of the potential toxicity associated with the use of this drug.

Ototoxicity, both vestibular and auditory, can occur in patients, primarily those with pre-existing renal damage, treated with GARAMYCIN Injectable, usually for longer periods or with higher doses than recommended.

GARAMYCIN Injectable is potentially nephrotoxic, and this should be kept in mind when it is used in patients with pre-existing renal impairment.

Monitoring of renal and eighth nerve function is recommended during therapy of patients with known impairment of renal function. This testing is also recommended in patients with normal renal function at onset of therapy who develop evidence of nitrogen retention (increasing BUN, NPN, creatinine or oliguria). Evidence of ototoxicity requires dosage adjustments or discontinuance of the drug.

In event of overdose or toxic reactions, peritoneal dialysis or hemodialysis will aid in removal of gentamicin from the blood.

Serum concentrations should be monitored when feasible and prolonged concentrations above 12 mcg./ml. should be avoided.

Concurrent use of other neurotoxic and/or nephrotoxic drugs, particularly streptomycin, neomycin, kanamycin, cephaloridine, viomycin, polymyxin B, and polymyxin E (colistin), should be avoided.

The concurrent use of gentamicin with potent diuretics should be avoided, since certain diuretics by themselves may cause ototoxicity. In addition, when administered intravenously, diuretics may cause a rise in gentamicin serum level and potentiate neurotoxicity.

USAGE IN PREGNANCY Safety for use in pregnancy has not been established.

INDICATIONS GARAMYCIN Injectable is indicated, with due regard for relative toxicity of antibiotics, in the treatment of serious infections caused by susceptible strains of the following microorganisms:

Pseudomonas aeruginosa, *Proteus* species (indole-positive and indole-negative), *Escherichia coli* and *Klebsiella-Enterobacter-Serratia* species.

Clinical studies have shown GARAMYCIN Injectable to be effective in septicemia and serious infections of the central nervous system (meningitis), urinary tract, respiratory tract, gastrointestinal tract, skin and soft tissue (including burns).

Bacteriologic tests to determine the causative organisms and their susceptibility to gentamicin should be performed.

Bacterial resistance to gentamicin develops slowly in stepwise fashion; there have been no one-step mutations to high resistance.

In suspected or documented gram-negative sepsis, GARAMYCIN may be considered as initial therapy. The decision to continue therapy with this drug should be based on the results of susceptibility tests, the severity of the infection, and the important additional concepts contained in the Warning Box. In the neonate with suspected sepsis or staphylococcal pneumonia, a penicillin type drug is usually indicated as concomitant antimicrobial therapy.

GARAMYCIN Injectable has been shown to be effective in serious staphylococcal infections. It may be considered in those infections when penicillins or other less potentially toxic drugs are contraindicated and bacterial susceptibility testing and clinical judgment indicate its use.

CONTRAINDICATIONS A history of hypersensitivity to gentamicin is a contraindication to its use.

WARNINGS See Warning Box.

PRECAUTIONS Neuromuscular blockade and respiratory paralysis have been reported in the cat receiving high doses (40 mg./kg.) of gentamicin. The possibility of these phenomena occurring in man should be considered if gentamicin is administered to patients receiving neuromuscular blocking agents such as succinylcholine and tubocurarine.

Treatment with gentamicin may result in overgrowth of nonsusceptible organisms. If this occurs, appropriate therapy is indicated.

ADVERSE REACTIONS

Nephrotoxicity: Adverse renal effects, as demonstrated by rising BUN, NPN, serum creatinine and oliguria, have been reported. They occur more frequently in patients with a history of renal impairment treated with larger than recommended dosage.

Neurotoxicity: Adverse effects on both vestibular and auditory branches of the eighth nerve have been reported in patients on high dosage and/or prolonged therapy. Symptoms include dizziness, vertigo, tinnitus, roaring in the ears and hearing loss.

Numbness, skin tingling, muscle twitching, and convulsions have also been reported.

Note: The risk of toxic reactions is low in patients with normal renal function who do not receive GARAMYCIN Injectable at higher doses or for longer periods of time than recommended.

Other reported adverse reactions, possibly related to gentamicin, include increased serum transaminase (SGOT, SGPT), increased serum bilirubin, transient hepatomegaly, decreased serum calcium; splenomegaly, anemia, increased and decreased reticulocyte counts, granulocytopenia, thrombocytopenia, purpura; fever, rash, itching, urticaria, generalized burning, joint pain, laryngeal edema; nausea, vomiting, headache, increased salivation, lethargy and decreased appetite, weight loss, pulmonary fibrosis, hypotension and hypertension.

DOSAGE AND ADMINISTRATION GARAMYCIN Injectable may be given intramuscularly or intravenously.

For Intramuscular Administration:

PATIENTS WITH NORMAL RENAL FUNCTION*

Adults: The recommended dosage for GARAMYCIN Injectable for patients with serious infections and normal renal function is 3 mg./kg./day, administered in three equal doses every 8 hours.

For patients weighing over 60 kg. (132 lb.), the usual dosage is 80 mg. (2 cc.) three times daily. For patients weighing 60 kg. (132 lb.) or less, the

usual dose is 60 mg. (1.5 cc.) three times daily.

In patients with life-threatening infections, dosages up to 5 mg./kg./day may be administered in three or four equal doses. This dosage should be reduced to 3 mg./kg./day as soon as clinically indicated.

*In children and infants, the newborn, and patients with impaired renal function, dosage must be adjusted in accordance with instructions set forth in the Package Insert.

For Intravenous Administration:

The intravenous administration of GARAMYCIN Injectable is recommended in those circumstances when the intramuscular route is not feasible (e.g., patients in shock, with hematologic disorders, with severe burns, or with reduced muscle mass).

For intravenous administration, in adults, a single dose of GARAMYCIN Injectable may be diluted in 100 or 200 cc. of sterile normal saline or in a sterile solution of dextrose 5% in water; in infants and children, the volume of diluent should be less. The concentration of gentamicin in solution, in both instances should normally not exceed 1 mg./cc. (0.1%). The solution is infused over a period of 1 to 2 hours.

The recommended dose for intravenous administration is identical to that recommended for intramuscular use.

GARAMYCIN Injectable should not be physically pre-mixed with other drugs, but should be administered separately in accordance with the recommended route of administration and dosage schedule.

HOW SUPPLIED GARAMYCIN Injectable, 40 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

Also available, GARAMYCIN Pediatric Injectable 10 mg. per cc., 2 cc. multiple-dose vials for parenteral administration.

APRIL, 1977
AHFS Category 8:12.2

For more complete prescribing details, consult Package Insert or Physicians' Desk Reference. Schering literature is also available from your Schering Representative or Professional Services Department, Schering Corporation, Kenilworth, New Jersey 07033.

*Due to susceptible organisms

Congenital Anomalies of Upper Urinary Tract

MANAS K. GHOSH, M.D., GEORGE M. FARROW, M.D. AND
WILLIAM L. FURLOW, M.D.

THE GENITOURINARY SYSTEM is formed by the combinations of elements from the undifferentiated mesenchyme, peritoneum, gut, and ectoderm at different stages. In early development, the most important structure is the urogenital ridge, which is formed from the undifferentiated mesenchymal tissue. The first portion of the ridge forms the pronephroi, which join together caudally to form the pronephric duct; the latter persists to unite with the mesonephros, forming the most important structure—the mesonephric duct or the so-called wolffian duct. Pronephroi do not function as such in humans and soon degenerate. The definitive kidney arises in part from the most caudal portion of the urogenital ridge and in part as an outgrowth of the mesonephric duct. A diverticulum grows out of the mesonephric duct, enters the mesoderm of the most caudal portion of the urogenital ridge, and forms the ureter, pelvis, and calices of the kidney. Through subdivision, the major and minor calices are formed. As the kidney develops, its position changes, moving upward from the true pelvis and rotating about 90° medially so that the renal pelvis, which was previously directed ventrally, faces the midline of the body. The bladder and urethra develop from the primitive cloaca.

Incidence of Anomalies

About 10% of all persons have some anomaly of the genitourinary system, and these anomalies account for approximately 30% of all urologic entities. The anomalies vary from minor ones that are rarely responsible for clinical manifestation to major malformations incompatible with extra-uterine life. Some malformations may predispose the kidneys to hypertension, pyelonephritis, or formation of calculi. At least 50% of persons with malformation of the genitourinary system have anomalies of other organ systems.

Congenital Anomalies of Kidney

The congenital malformations of the kidneys

may be described under three main groups: anomalies of the amount of renal tissue (deficient or excessive); anomalies in position, form, or orientation or any combination; and anomalies of differentiation.

Anomalies of Amount of Renal Tissue

Bilateral Renal Agenesis.—More than 200 cases of this anomaly have been reported. Because the condition is incompatible with extra-uterine life, nearly all instances have been found at autopsy—and most in stillborn infants, for only a small



Fig. 1 A—Congenital absence of right kidney. Only adrenal gland is evident.

From the Mayo Clinic and Mayo Foundation, Rochester, Minnesota.

See editorial, page 619.

number live a few days after birth. In about 75% of cases, maternal oligohydramnios or total absence of amniotic fluid is noted. More males than females have renal agenesis (2:1). The facial appearance is rarely normal with this condition. The deformities of the ears, which are low set and deficient in auricular cartilage, are conspicuous. Bilateral pulmonary hypoplasia is an almost consistent finding. The adrenal glands are characteristically ovoid. Bladder, urethra, and gonads are absent in one fifth of cases.

Unilateral Agenesis (Figure 1 A).—There have been about 1,000 cases of this anomaly reported. The left kidney is more frequently absent, and the condition is commoner in males than in females. The homolateral adrenal gland is absent in 5% of cases; the ureter is absent in 50% and is atretic in 25%. In 10% of the cases, the homolateral half of the vesical trigone is absent. Rarely, a single kidney may be ectopic and even more rarely it is crossed. Excretory urograms, cystoscopic examinations, and arteriograms help in the diagnosis.

Congenital Renal Hypoplasia.—This is a rare entity that is often difficult to differentiate from ischemically contracted, atrophic pyelonephrotic, and atrophic hydronephrotic kidneys. The morphologic criteria by which a kidney may be judged truly hypoplastic are poorly outlined. Size of the renal artery is not a true guide because the artery that supplies a secondarily diseased kidney eventually becomes atrophic.

Supernumerary Kidney.—A supernumerary kidney is a mass of renal tissue that has no parenchymatous connection with the definitive kidney. Some duplication of the renal pelvis is present in about 10% of all cases, but a true supernumerary kidney is extremely rare. The excretory urographic demonstration of extra-collecting systems is not enough for the diagnosis of a supernumerary kidney unless the systems are so widely separated that communication between renal masses can be reasonably excluded. Supernumerary kidneys may be as large as the normal organ, but usually they are small and drain through an independent pelvis into the normal ureter on the same side. About two thirds of the supernumerary kidneys are symptomatic, usually because of infection.

Anomalies of Form, Position, or Orientation

Horseshoe kidney, pancake kidney, and disk, sigmoid, and donut kidneys are fused kidneys that

represent anomalies of form.

The horseshoe kidney is the most common anomaly of form. Usually, the fusion is at the lower pole (Figure 1 B), but rarely it can be at the upper pole (Figure 1 C), giving the appearance



Fig. 1 B—Horseshoe kidney, common type in which lower pole is fused. Note abnormal vascular pattern.

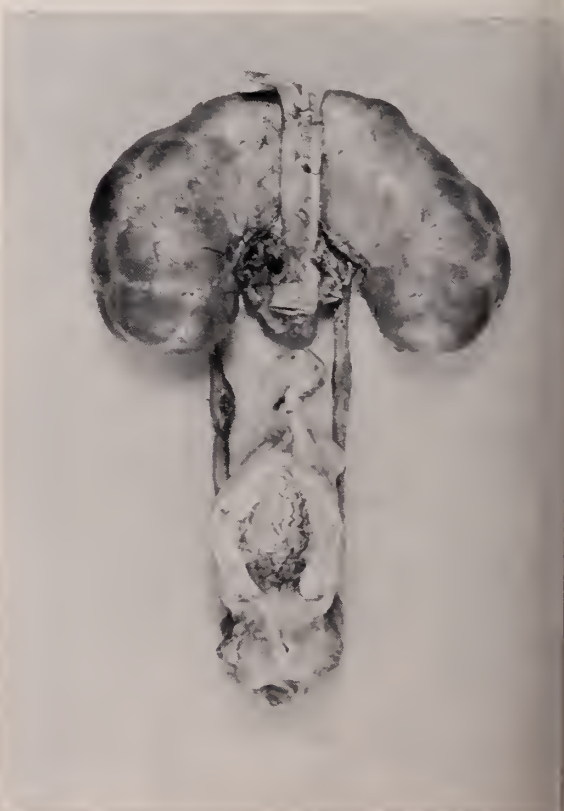


Fig. 1 C—Horseshoe kidney, uncommon type in which upper pole is fused.

ance of a horseshoe. The kidney is often low lying, and because of the associated malrotation, the renal pelvis is seen overlying the calices on the excretory urogram; the calices are more in the sagittal than in the oblique plane. The kidney almost always has multiple vascular supplies, which are of important clinical significance when the decision of surgery arises. The incidence of horseshoe kidney varies from one in 400 to one in 1,800.

In fused crossed ectopia, both kidneys are on the same side, being fused to each other, although the ureters enter the bladder in the normal position. The crossed kidney lies below the normal kidney, the latter often being in a low position. There is associated malrotation, and the calices may be club-shaped without being abnormal.

Complete fusion produces the cake or disk kidney. If the upper pole of one kidney fuses to the lower pole of the opposite kidney, a sigmoid kidney is produced (Figure 2 A).

The most common anomaly of position is pelvic kidney, the unascended kidney (Figure 2 B). The kidney can be found anywhere on its normal course of ascent. An unascended kidney is invariably associated with malrotation. However,

this type must be differentiated from the ptotic kidney in which the ureter is of normal length but is kinked because of redundancy. Crossed fused renal ectopia is abnormal not only in form but also in position (Figure 2 C). The crossed unfused renal ectopia is a rare entity. Crossed solitary renal ectopia is a rarer variety and has been mentioned under the heading of renal agenesis.

A thoracic kidney has been reported as an incidental finding on a chest roentgenogram or an excretory urogram. This is another rare entity, more often situated on the left side.

Anomalies of Differentiation, Etc.

Congenital Hydronephrosis.—This anomaly, which is often bilateral, is due to obstruction at the ureteropelvic junction (Figure 2 D). This lesion is the most common cause of an upper abdominal mass in infants and children. Evidently,



Fig. 2 A—Sigmoid kidney.



Fig. 2 B—Normal positioned left kidney and pelvic right kidney. Note malrotation of pelvic kidney, position of renal pelvis, and vascular pattern.

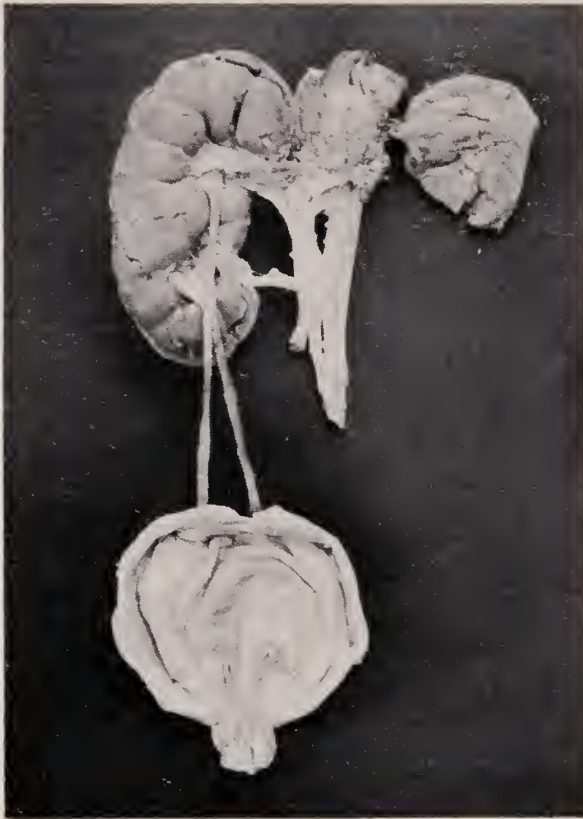


Fig. 2 C—Crossed, fused renal ectopia.



Fig. 2 D—Hydronephrotic left kidney sectioned to show obstructive ureteropelvic function.

the clinical manifestations show up at an early age if the obstruction is severe. If mild, the condition will often escape detection until adult life. An excretory urogram helps in making the diagnosis, and a retrograde pyelogram is often needed when the obstruction is severe. The cause of congenital obstruction of the ureteropelvic junction is not known in most instances, the narrowing being an idiopathic stenosis. In a few cases the ureteropelvic junction may be extrinsically compressed by adjacent anomalous vessels.

Cystic Anomalies of the Kidneys.—Kidney cysts may be either acquired or congenital. Congenital cysts are further subdivided into infantile and adult types. Congenital polycystic kidney have an overall incidence of one in 350 autopsies. The entity has a definite heredofamilial predisposition and often is associated with polycystic conditions of other viscera such as the liver and pancreas. The distinction between the adult and the infantile type is based on the observation that the former has more functioning renal tissue with larger cysts and the latter has multiple uniform small cysts which, on cut surface, give the appearance of a honeycomb. This distinction is of prognostic importance. The kidneys are enlarged in both types of cysts. Most often, polycystic kidneys are bilateral.

A distinct unilateral cystic entity known as multicystic kidney needs to be differentiated from the polycystic kidney. In the former, the appearance of the kidney is lost and is replaced by a mass of thin-walled cysts that have variable size and configuration and are associated with an atretic pelvis and ureter. The multicystic kidneys have no heredofamilial predisposition and are not associated with cystic conditions of other viscera. The artery that supplies the mass is very small and the condition is often associated with aberrant vessels.

Anomalies of the Blood Supply—About 20% of the general population have more than one main renal artery to a kidney. This is more often unilateral than bilateral. Congenital renal arteriovenous malformations are present on arteriographic studies, but such malformations are rare; when this condition is detected in an adult, there is a possibility of a hypernephroma, particularly in a patient who is in the fourth or fifth decade. Other vascular anomalies include congenital renal artery stenosis and idiopathic fibromuscular hyperplasia.

Congenital Anomalies of Pelvis and Ureter*Renal Pelvis and Ureter*

The pelves may vary in number: bifid, trifid, and multifid pelves. These variations are not uncommon and are considered normal, even though they represent a minor error in formation. Differentiation between partial duplication and bifid pelves may be difficult.

Duplication of Pelves and Ureters

Duplication may be partial or complete (Figure 3 A) and unilateral or bilateral. Complete duplication is present when each ureter enters the bladder separately (Figure 3 B) and has a respective ureteral orifice. Incomplete duplication occurs when the ureters of the two pelves unite to form a common ureter before they enter the bladder. The ureter from the lower pelvis, in complete duplication, almost always has the highest and most laterally placed ureteral orifice. Excretory urograms, cystoscopic examinations, and retrograde studies are necessary to diagnose this condition.

Anomalies in Position or Form of the Ureter

Ectopic Ureteral Orifices—This condition is of great clinical importance for two reasons. First, the patient is incontinent if the orifice is distal to the sphincter and second, an opening in the abnormal position is more likely to be obstructed. For the male, the potential sites of an ectopic ureteral orifice are the vesical neck, prostatic urethra, seminal vesicles, vas deferens, and ejaculatory ducts. For the female, the sites are the vesical neck, urethra, vestibule, vagina, cervix, uterus, and fallopian tubes. In either sex, the rectum may be a site. An ectopic orifice is almost always associated with a duplicate system, and the ectopic orifice serves the upper pelvis. An ectopic orifice in a single system is rarely encountered.

Rudimentary Branched Ureter.—Rudimentary branched ureter with a blind ending is a rare anomaly signifying a futile attempt by the ureter to duplicate. A short branching is referred to as a ureteral diverticulum. Most of the ureteral diverticula are acquired from injury, obstruction, or infection.

Retrocaval Ureter (Circumcaval Ureter, Postcaval Ureter).—This was first described in 1893 by Hochstetter as an autopsy finding, and more than 100 cases have been reported in the world literature. The right ureter is almost always involved. One case has been reported from our institution, and in this case, the left ureter was retro-

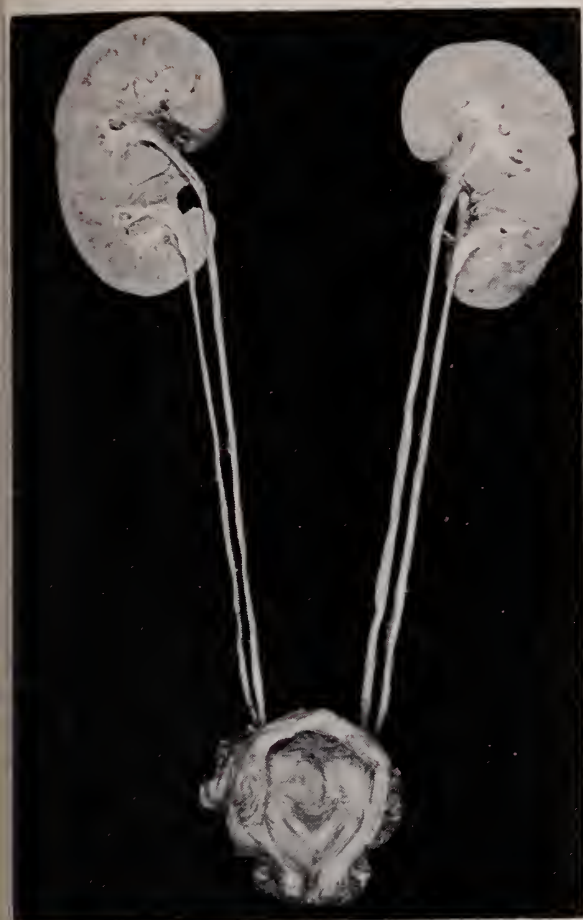


Fig. 3 A—Complete bilateral duplication.

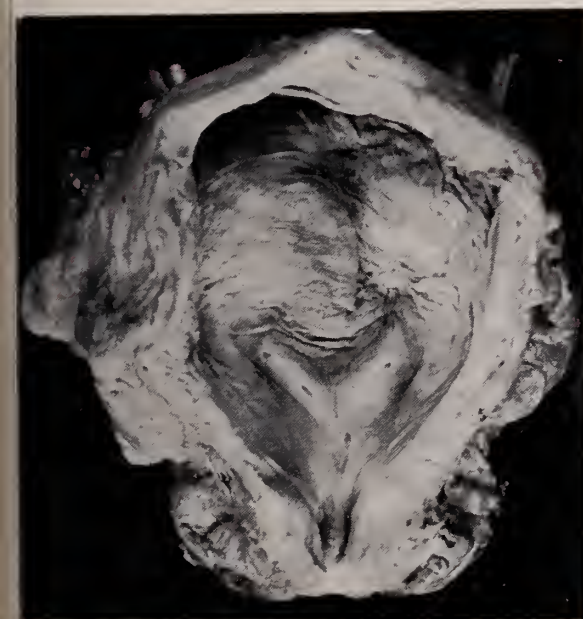


Fig. 3 B—Closeup of bladder showing independent entries of the four ureters into the bladder.

caval with situs inversus. Retrograde study in association with venacavagraphic findings confirms the diagnosis. The condition needs proper attention when the patient is symptomatic from the

hydronephrotic kidney secondary to obstruction of the affected ureter. The abnormality of the development of the condition primarily lies with the vena cava rather than the ureter.

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Ben Battle was a soldier bold,

And used to war's alarms:

But a cannon-ball took off his legs,

So he laid down his arms!

Now as they bore him off the field,

Said he, "Let others shoot,

For here I leave my second leg,

And the Forty-second Foot!"*

*Thomas Hood: Faithless Nelly Gray, 11:1, 1826.

Case Report

Scleroderma and Esophageal Hiatal Hernioplasty

DAVID E. LANGDON, COLONEL, USAF, MC* AND EVAN F. LINDBERG, M.D.†

MOST PATIENTS with systemic scleroderma have esophageal involvement with absence of peristalsis in the smooth muscle portion of the esophagus, decreased strength of the lower sphincter, and, in many, dilatation due to loss of contractile strength from muscle atrophy. Marked reflux is frequently demonstrable both clinically and radiologically. Hiatus hernias have been commonly associated.^{1,2,3} Intractable esophagitis, ulceration and stricture may result. Such patients are prone to food, especially meat, impactions. In advanced cases there are associated motility problems of the small bowel, colon and stomach. Due to delayed gastric emptying, patients may retire with a full stomach at night even though the evening meal was eaten many hours before with consequent massive protracted nocturnal regurgitation and the potential for broncholaryngeal complications. We routinely institute an antireflux program concomitant with the initial diagnosis of scleroderma. We have had the experience of an early scleroderma patient with normal esophagus by motility and x-ray studies present to us one year later with esophageal ulcer and stricture. The pathophysiology of the sclerodermatous esophagus may simply defeat even the best medical regimen to control reflux.

The successful operative correction of esophageal reflux requires either reconstruction of the esophagogastric closing mechanisms, or the gastric resective procedures, at times including reanastomosis of the GI tract in such a manner as to prevent acid or alkaline esophagitis.⁴ Antireflux operations often include a plication, which in five to 15% of patients with normal peristalsis, results in problems of food passage through the plicated

segment requiring single or multiple dilatations. One would expect profound problems in a patient without peristalsis and decreased muscle contractile strength. The Belsey Mark IV hiatal hernioplasty has been highly successful in correcting esophageal reflux.⁵ This repair includes the artificial reconstruction of the gastro-esophageal junction below the diaphragm by wrapping the fundus of the stomach around the distal 2-3 cm of the esophagus. Logical reservations arise in considering the operative approach regarding consequences of sclerodermatous muscle atrophy, vascular involvement, collagen replacement and adverse effects on healing.

Case Report

A 37-year-old woman consulted her physician in 1965 because of joint pains of the hands. By Xray the joints were normal, but the distal ends of the fingers were noted to be abnormally tapered and scleroderma was suggested as the diagnosis. Skin changes at that time were definite, though mild, involving the face and hands. Raynaud's phenomenon was present. Biopsy confirmed the diagnosis of scleroderma. Intermittent dysphagia began in 1966 which progressed to choking and regurgitation of solid foods in 1968. Between October 1968 and February 1971 there were two documented episodes of aspiration pneumonia. The broncholaryngeal problems were severe with nightly paroxysms of cough, gastric contents regurgitating into the throat and protracted morning cough. These occurred in spite of sleeping on pillows with the bed elevated 12 inches on blocks. Frequently she would have to sit in a chair at night for sleep. She required large doses of codeine to control cough sufficiently to permit intermittent sleep. Pulmonary function tests showed only the progressive development of moderate airway obstructive changes. She was chronically hoarse and laryngoscopy revealed marked inflammatory changes of the larynx, hypopharynx and arytenoid areas. She noted marked regurgitation of food during the day as well and lost approximately 50 pounds in weight. Meat impactions occurred on two occasions responding to proteolytic enzymes and bougienage. Gastrointestinal Xrays confirmed a small hiatus hernia with free reflux of barium into the esophagus. Reflux was confirmed using blue food dye in capsules swallowed at bedtime resulting in deep blue staining of the hypopharynx

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See editorial, page 618.

CASE REPORT

and vocal cords. Fiberoptic esophagoscopy revealed moderate esophagitis, a small hiatus hernia associated with a wide open distal esophagus and no visible closing mechanism. No stricture nor ulcerations were noted. Frank reflux of gastric contents into the upper esophagus was evident. An esophageal motility study (Figure 1) confirmed aperistalsis with absence of the distal high

pressure zone at the gastroesophageal junction. After infusion of 0.1 normal HCl into the stomach by tube frank reflux was demonstrated throughout the length of the esophagus by pH electrode. Basal achlorhydria was present on gastric analysis with the pH falling to five after 100 mg of betazole.

The patient conscientiously followed a difficult pro-

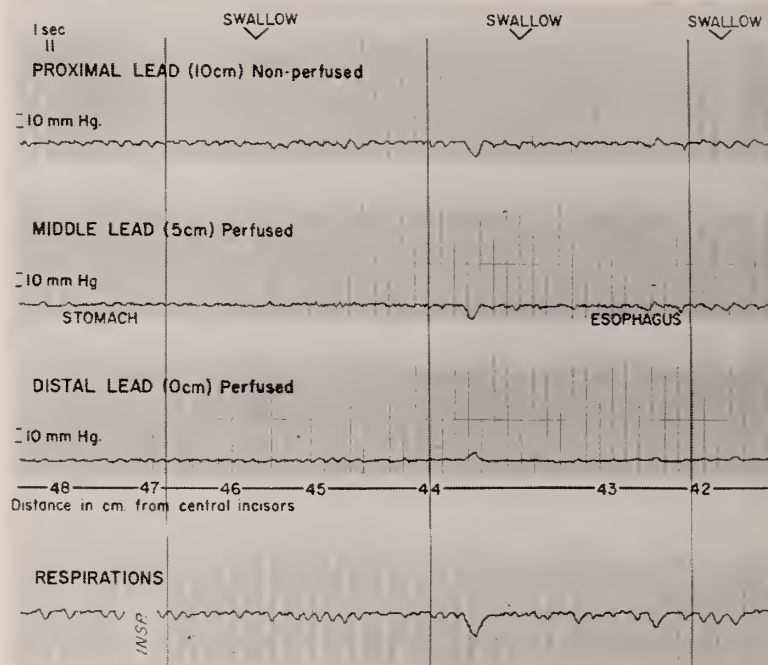


Fig. 1—Preoperative esophageal motility study. The tracings confirm the aperistalsis and absence of a distal high pressure zone at the gastroesophageal junction.

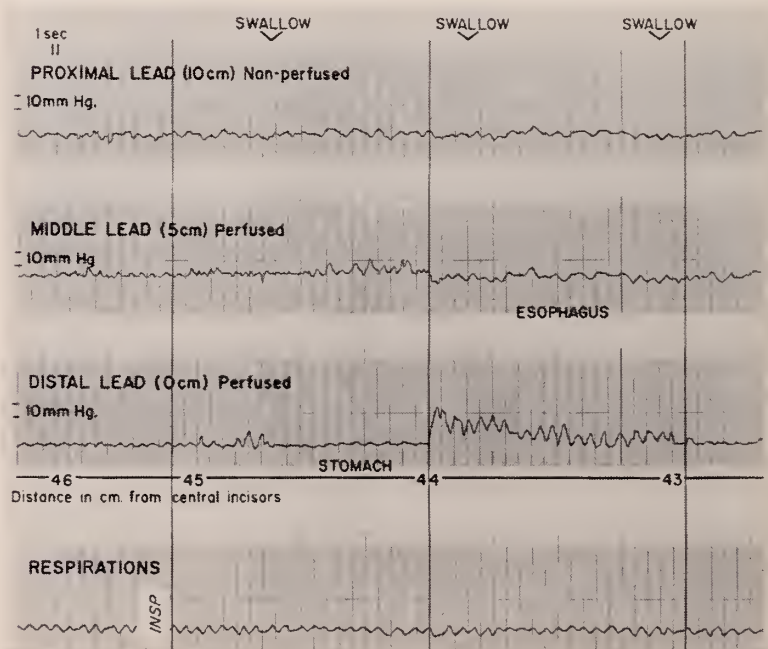


Fig. 2—Postoperative esophageal motility study (six weeks). There is an area of increased pressure demonstrated in the region of the gastroesophageal junction.

gram of total medical management with no improvement in her symptoms.

Accordingly, in February 1971, a Belsey Mark IV hiatal hernia repair was performed. At surgery there was a small hiatal hernia defect of the sliding type. A mild inflammatory reaction was present in the distal one-third of the esophagus without ulceration or perforation. The repair was performed as described by Belsey,⁵ bringing the gastro-esophageal junction below the diaphragm without tension. Solid foods were begun on the fourth post-operative day with a mild sensation of sticking in the distal esophagus, persisting until dilatation on the ninth post-operative day (Hurst rubber bougie—size #40). During six months of follow up she sleeps flat in bed and is free of nocturnal and morning cough. Her voice and larynx have returned to normal. She has regained 30 pounds of weight. She has had no difficulty with sticking food, though careful to chew her food well. Esophageal motility study performed six weeks following surgery (Figure 2) revealed an area of increased pressure at the gastro-esophageal junction. Reflux could be demonstrated only during provocative maneuvers. Spontaneous reflux after installation of acid into the stomach was absent.

Discussion

One naturally has grave reservations about surgical intervention in a patient with scleroderma of the esophagus. Payne, et al.⁴ have utilized hemigastrectomy with vagotomy to control acid-peptic secretions, coupling this with an interposition of the small bowel between the gastric remnant and the duodenum to prevent biliary and pancreatic

reflux of the esophagus. At the time of this report, they had experience with two patients with scleroderma of the esophagus, both of whom had severe stenosis and esophagitis with previous attempts at diaphragmatic hiatus hernia repair. These patients have done well following the procedures they described and they noted no difficulty in handling the sclerodermatous tissues.

In the United Kingdom, Belsey has had experience with one case similar to ours.⁶ A Belsey Mark IV hiatal hernioplasty was performed in this patient with satisfactory results during the two year follow-up period.

In our patient, the Belsey repair has had a dramatic impact. She was a hyposecretor and esophagitis had not been a significant problem. During the one year period we have followed this patient postoperatively, there has been no increase in esophageal size and dysphagia has not recurred. This is in spite of progression of her scleroderma in other areas including problems with colonic and small bowel dilatation. The long term performance of an aperistaltic esophagus combined with an antireflux operation remains to be evaluated.

Acknowledgments

We would like to express our appreciation to Lt. Col. John R. Harlan, USAF, MC, for esophageal motility studies and Mrs. Martha Zieber for dedicated secretarial support.

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Continued on page 650

Nephrology and the Practitioner*

A Regional Approach to Service and Education

FRED L. SHAPIRO, M.D., F.A.C.P.[†] and RUSSELL KNUTSON, M.D.

NEPHROLOGY is one of the newest and most rapidly developing medical subspecialties. A remarkable increase in knowledge about the pathogenesis, diagnostic techniques, therapy, and prognosis of renal disease, and hypertension has recently occurred. The development and application of renal transplantation and regular hemodialysis to patients with end-stage renal disease have been a strong catalyst to the increased interest in nephrology. Another major factor has been the development of diagnostic procedures useful in studying patients with renal disease and hypertension. These include infusion intravenous urography, isotope scans and renograms, arteriography, clinical renal function tests (creatinine and ¹³¹I iothalamate clearances), assays for renin, aldosterone, parathormone, complement, immunoglobulins, and most importantly, the increased use of closed renal needle biopsy with thin sections, special stains, immunofluorescent, and electron microscopic studies. Although transplantation and dialysis have received considerable publicity in the lay and medical literature, other advances have received less emphasis.

This paper describes an innovative program involving patient services and physician education designed to improve the quality of care being provided to patients with renal disease and hypertension. The program has been developed and is being offered as a service of Hennepin County General Hospital (HCGH) Division of Nephrology.

Background Information

In the past several years many patients with acute and chronic renal failure have been referred to our center at HCGH for evaluation and therapy.

Hennepin County General Hospital, Division of Nephrology, Minneapolis, Minnesota.

*This program is part of the Minneapolis Medical Research Foundation, Inc.

[†]Chief of Nephrology Service, Hennepin County General Hospital and Associate Professor of Medicine, Hennepin County General Hospital and University of Minnesota.

It has been apparent to us that primary physicians are frequently unaware of the recent information about diagnostic procedures, improved therapeutic measures and the possibilities for rehabilitation. There are misconceptions and compromised therapeutic measures being applied because of a lack of current knowledge. Some examples of common practices which may not be the "best" approach include:

1. Forcing fluid to all patients with renal insufficiency. As patients develop preterminal renal failure, they frequently are unable to excrete a large water load. Forcing fluids can jeopardize the patient's life as it may precipitate increasing hypertension, congestive heart failure and pulmonary edema. Urine volume in excess of 2500 cc daily is of no value except in conditions such as chronic nephrolithiasis, multiple myeloma, gout and oxalosis and, in these conditions, fluids may have to be restricted if renal failure develops.

2. Sodium is often restricted when patients have renal disease. Most patients do not require strict sodium restriction. In fact, it is important for the patient to take in as much sodium as his kidneys can excrete to maximize residual renal function. It is a common occurrence for patients to lose large amounts of sodium in the urine and, if not replaced, hypovolemia will result leading to decreased renal blood flow, diminished filtration rate and increasing uremia. Sodium should be restricted only to the level excreted daily by the kidneys, which usually becomes fixed within a relatively narrow range as renal insufficiency progresses.

3. Hypertension is often inadequately treated when renal insufficiency coexists because of fear of worsening the renal insufficiency. Hypertension should be treated and the blood pressure maintained at near normal levels to prevent rapid progression of the renal disease and other complications. As the blood pressure decreases, there

may be a transient rise in the blood urea nitrogen (BUN), but usually creatinine will stabilize or decrease and later the BUN may also decline. Methyldopa and hydralazine are the most useful antihypertensive agents when significant renal insufficiency is present. Diuretics should be used with caution.

4. Furadantin® and Mandelamine® are prescribed for chronic urinary tract infections in patients with renal insufficiency in whom the agents may be ineffective. When the creatinine clearance decreases below 30 cc/min, these agents do not reach significant concentration in the urine. Mandelamine must be in an acid urine (pH under 5.8) to be effective.

5. The diagnosis of chronic urinary tract infection is often made on the basis of chronic pyuria instead of repeated bacteriuria. Chronic pyuria may occur in patients with nephrosclerosis and in any of the several forms of interstitial nephritis in the absence of infection.

6. Some previously controversial areas now have been clarified: the incidence of pyelonephritis and analgesic nephropathy; the use of steroids and immunosuppressive agents in the nephrotic syndrome and various glomerulopathies; the evaluation and treatment of patients with hypertension; selection of patients for dialysis and transplantation; when these therapies are indicated; the prevention of acute renal failure; and the appropriate use of renal biopsies.

There are several reasons why there continues to be disparity between the availability of medical knowledge and its application. The usual approaches to postgraduate education, including medical meetings, postgraduate courses and journal articles, have been relatively ineffective. One of the reasons for this slow dissemination of knowledge is that patients with significant renal disease are relatively uncommon, therefore, most physicians are rarely exposed to the problem. They do not have the benefit of recurrent patient exposure to reinforce learning. Most textbooks on renal disease are either outdated or too technical to be of major assistance to physicians in clinical practice. The current renal literature has been disseminated through various journals making it cumbersome to obtain specific information. Nephrologists primarily involved in fulltime academic activities, including undergraduate and graduate training, research and direct patient

services, have little time to assist physicians in becoming more effective in caring for the patients.

Since the mid 1960's, the Nephrology Division at HCGH has developed a regional treatment program for people with advanced renal disease. The program includes patient evaluation, diagnosis, appropriate medical management, chronic dialysis and renal transplantation as indicated. Dialysis is offered at home, in seven satellite units located in hospitals in Albert Lea, Hibbing, Little Falls and Willmar, Minnesota; Fargo, North Dakota; and in Sioux Falls and Rapid City, South Dakota. There is a large limited care dialysis center in Minneapolis to serve the metropolitan area. The program is coordinated and backed up by the acute dialysis facility and the Nephrology Division at HCGH which comprise the Regional Kidney Disease Center (RKDC)—a nonprofit unendowed foundation. Patients from the region including western Wisconsin, are given a choice as to the type of therapy they will receive and the treatment is performed either in or near their home whenever possible. A few patients who could have benefited from earlier evaluation have been referred to us for treatment of end-stage disease. In some of these patients the end-stage disease may have been preventable, while in others complications could have been averted. Some patients in this region with acute and chronic renal failure, who may have been helped died without being evaluated by a nephrologist.

Evaluation and Training Program

We are attempting to resolve some of the above problems by expanding our established regional program for patients with acute and chronic renal failure into a more comprehensive program for patients with all forms of renal disease and hypertension. We have initiated an inpatient evaluation center at the Metropolitan Medical Center (MMC). Patient services and education are major goals. Our primary responsibility is to provide referring physicians with information regarding management of their patients. Our approach to postgraduate education utilizes recurrent patient contact as the major reinforcement of knowledge acquired by the physician from summaries, explanations and reprints, i.e. a consultation course, provided to him from the evaluation center.

Because of the inadequate physical plant of the current HCGH, the evaluation unit was established at the MMC, the private hospital complex with which the new HCGH is collocating. The facilities at MMC are more conducive to patient comfort and convenience. The patients are admitted to a self-care unit which permits them to take meals in the hospital cafeteria. They are encouraged to remain as active as possible.

The unit is an extension of the HCGH Nephrology Division. The physician staff consists of a Nephrology Fellow, medical house officers and a Nephrology Staff Consultant.

We involve the patient in his own care. He is instructed in monitoring his blood pressure and weight, in what activity level is reasonable for his status and the fundamental aspects of dietary control including defining desired intake of sodium, potassium, fluid, calories and proteins, as well as clarifying the difference between high and low quality proteins. The prognosis as well as the complications of treatment are explained to the patient. When appropriate, specific financial

and vocational counseling is provided by the RKDC staff counselors. For those patients who may require dialysis and/or transplantation, these procedures are explained including the various treatment possibilities, their indications for initiation and the results to be anticipated.

We expect that this type of service provided to referring physicians will assist them in caring for their own patients in the home, reinforcing the patient's confidence in his physician. The physician is provided a continuing educational service. Each patient visit will reinforce information presented in the "consultation course" to the physician.

Early evaluation and long-term observation of patients with renal disease and hypertension are necessary for the development of increased understanding and improved treatment for these patients. Programs such as the evaluation center will make a contribution to the medical community in acquiring and disseminating new knowledge.

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The widow brought action against the coroner and deputy coroner to recover damages for mental anguish allegedly suffered because of the wrongful postmortem examination.

At the trial, the embalmer testified that he withdrew the blood sample and sent it to the coroner's office at the specific request of the deputy coroner. The coroner and deputy said that the deputy not only acted within his authority but also that he had a lawful duty as a deputy coroner to cause the examination to be made. The court ruled in favor of the coroner, contending that it was his right and duty to perform such indicated examinations.

Theodore A. Peterson, M.D.
Minneapolis, Minnesota

Hazelwood V. Stokes, 483 S.W. 2d 576 (Ky. Ct. of App., February 4, 1972). The Citation V 27:1, April 15, 1973.

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Book Reviews

HEMATOLOGY. William J. Williams, Ernest Beutler, Allan J. Erslev and R. Wayne Runales, plus multiple contributors. 1419 pages. McGraw-Hill Book Company, publisher. 1972. Price: \$32.50.

This new textbook of hematology offers those interested in blood disorders a well organized, very complete reference source. It is written in a very straight forward informative manner, and seems well organized on a morphologic basis. There are only occasional color plates, but the quality of those presented are excellent. The black and white figures as well as charts and tables are prevalent, well placed and seem to supplement the text. The book is well indexed, so that material is easily found.

The text is divided into five parts, starting with the basic approach to patients with suspected hematologic diseases, and progresses through the red cell disorders, white cell disorders, coagulation to replacement. Each section is reasonably complete and attempts to answer many common diagnostic and management problems. In addition there is a rather extensive appendix describing various laboratory techniques from special staining to interpretation of erythokinetics.

It appears that this text will emerge as a major contribution to the field of hematology. It can be utilized by those occasionally wishing to review aspects of hematology and those wanting some detailed basic information.

It is hoped that the authors will continue to update the text as necessary and that the high quality exhibited in the first edition will continue. This textbook is recommended to all physicians who have an occasion to utilize information relating to hematology.

Neil R. Hoffman, M.D.
Minneapolis, Minnesota

BABY'S RECIPE BOOK. Linda McDonald. A. S. Barnes & Co., New York. \$8.95.

The high marketability of anything for babies plus the allure of an attractive cover will probably put this overpriced volume in the hands of many mothers. For this reason it is well for the practicing physician to be aware of the contents.

The title is a misnomer. Recipes are included but the text is essentially a manual of nutrition for children from birth through 12 years of age. Much of the material could be condensed without sacrificing either clarity or the easy-to-read format.

The overall concepts presented are good ones. Undoubtedly the author spent considerable time researching the impressive list of articles quoted from professional

sources. It is unfortunate that enough misinformation, inconsistency, and questionable interpretation are found to keep it from being wholeheartedly recommended as a resource for mothers.

Martha Burke-Strickland, M.D.
Minneapolis, Minnesota

SYNOPSIS OF SURGERY, Second Edition. Liechty and Soper. Publication June, 1972. C. V. Mosby Co. \$15.50. 1108 pages. 669 illustrations.

This text is a general review of surgery and the surgical specialties written by Richard D. Liechty, M.D., Associate Professor of Surgery, and Robert T. Soper, MD., Professor of Surgery, and 24 collaborators, all with the exception of three, currently on the faculty of the University of Iowa, College of Medicine, Iowa City, Iowa.

The book is designed as a text for the beginning medical student or a "seasoned physician" who wants a brief review of a surgical topic. All chapters have been updated, and chapters on transplantation, total parenteral feeding and gynecology have been added. References to each chapter are appended at the end of the book, but are not correlated with specific statements in the book.

The usual divisions of organ systems is followed, but chapters on malignant neoplasms, gastrointestinal hemorrhage, intestinal obstruction, pediatric and geriatric surgery are included. Wound healing, fluid and electrolytes, shock, infection and pre- and post-operative care are covered in separate chapters.

In general, the book presents the opinions and methods of the faculty of the University of Iowa. Only one side of controversial subjects is presented, and alternatives are not discussed. This may be well for the reader for whom the book is intended.

The chapter on fluids and electrolytes may be somewhat confusing without supplementary, explanatory descriptions. The chapter on the hand by Furnas and Flatt is exceptionally good and up to the usual standards of Dr. Flatt. Dr. Flock's complete chapter on urology must also be complimented. The illustrations are for the most part good and supplement the text; although occasional pictures tend to show the extreme, unusual manifestation of a particular disease or injury.

The book can be recommended for those for whom it was written as well as for surgeons who want a quick reference or surgical resident preparing for board examinations.

Farrell S. Stiegler, M.D.
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MINNESOTA MEDICINE REPRESENTS

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atively normal blood and urine sugar, may result from excessive phenformin therapy, excessive insulin reduction, or insufficient carbohydrate intake. Adjust insulin dosage, lower phenformin dosage, or supply carbohydrates to alleviate this state. **Do not give insulin without first checking blood and urine sugar.**

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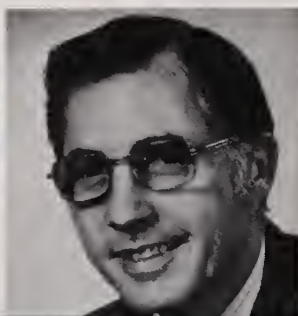
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Opinion & Dialogue

"Prescription drugs – who should determine the maker?"

Dispenser of Medicine

Clifton J. Latiolais
President
American
Pharmaceutical
Association



Maker of Medicine

C. Joseph Stetler
President
Pharmaceutical
Manufacturers
Association



"Too many doctors are indifferent to the economic consequences of their decisions." So stated a recent issue of *Medical News Report* (December 4, 1972), an independent weekly newsletter published by AMA Chief Executive F. J. L. B. game, M.D.

Doctor, are you indifferent...?

In discussing an anticipated increase in Blue Shield rates, Dr. B. ingame's newsletter had this to say:

"In general, it can be said that we have given the impression that we are not particularly concerned with the increase in cost of health care for patients..."

"True, an MD's training is primarily scientific, but in the real world of practice, all of his scientific decisions have a price tag, or an economic impact. The economics of health care beckon the practitioner's attention. Concern for economics of medicine..."

When the pharmacist recommends that a drug product other than the one ordered be dispensed, the prescriber invariably permits the change when he feels the best interests of the patient will be served.

Shortcomings of Pro-Substitution Argument

The fact remains that it is necessary for the prescriber to know when the change is being contemplated, and to be in a position to consent or demur. Without that opportunity, a unilateral decision of the pharmacist made in the absence of clinical knowledge of the patient, could expose him to needless risks, and in addition, jeopardize the relationship between the professions of Pharmacy and Medicine. In my view, there is no offset in the pro-substitution argument that offsets these risks.

The Issue of Drug Knowledge

Substitution advocates claim that the primary justification for changing the rules is the desire to better utilize pharmacists' knowledge about drugs. Yet the pharmacist's task to keep current on the entire field of drug therapy, to some extent, puts him at a disadvantage. More often, a practicing physician with expert knowledge of no more than

ould be an obligation of medical
rvice...

"Medical societies ought to con-
tinuing campaigns to point
he substantial savings that could
alized thru deductible insurance
protection for catastrophic ill-
e. At the very least, they should, in
patients' interest, question the
ices of any insurance organization
raises health care costs by forc-
policyholders to buy insurance
may not need or want and prob-
won't ever use.

"Too many doctors are indiffer-
to the economic consequences of
e decisions. Too many, for ex-
re, habitually hospitalize patients
ne convenience of the MD. It's
ense to deny such habits exist...

"Doctors, thru their medical so-
es, have unhesitatingly appealed
eir patients for support in the
g against government interference
at the private practice of medicine.
n the public in the past has re-
oded. It's time the American Med-
a Association and state and local
elical societies paid off the debt by
esive action to hold down the cost
medical care."

o of Drugs

Insurance rates and hospital
ages are only two factors in health

o drugs that he selects to treat the
arity of conditions encountered in
practice. Moreover, the physi-
as choice of a specific brand is
ed on his knowledge of the pa-
el's medical history and current
ition, and his experiences with
e articular manufacturer's
ruct.

Some substitution proponents
argued that the dispensing of a
cription is a simple two-party
a action between the pharmacist
n the patient, and that a substit-
g pharmacist may avoid even a
chical breach of contract by simply
tlying the patient that he is making
ubstitution. I would judge that
vourts would be sympathetic
toward a pharmacist who substituted
out physician approval and who
nrtook a legal defense that seeks
ake the patient responsible for
e pharmacist's actions.

ected Prescription Prices?

Substitution advocates are
gesting to the consumer, and par-
ticularly the consumer activist, that
ected prescription prices could
lly legalization of substitution.
eave seen absolutely no evidence
t justify this claim. To the contrary,
xperience in Alberta, Canada, where
ubstitution is authorized, suggests

care costs. The cost of drugs—both
prescription and nonprescription—is
another.

And when it comes to drug
costs, the nation's pharmacists are
concerned. Through their national
professional society, the American
Pharmaceutical Association, pharma-
cists are advising the public to use
nonprescription medication cau-
tiously and conservatively, and to seek
the advice of their pharmacist before
selecting or purchasing such drugs.

Outdated Laws

The pharmacist also is aware
that when it comes to prescription
drugs, often he has an even greater
opportunity to reduce the cost to the
patient—with no sacrifice in the qual-
ity of the medication dispensed. But
in many states, outdated and anti-
quated laws prevent the pharmacist
from engaging in drug product selec-
tion. "Drug product selection" simply
means that the pharmacist functions
in the patient's interest by con-
sciously choosing, from the multiple
brands available, a low-cost quality
brand of the specific drug to be dis-
pensed in response to the physician's
prescription order.

Much *misinformation* has been
purposely spread by those who stand
to gain financially by maintaining

the opposite.

Many pharmacists understand-
ably are concerned about the cost of
maintaining multiple stocks of similar
products. While there is no doubt that
inventory costs rise when additional
brands are stocked, it would be inter-
esting to know how much they rise,
and how many pharmacists actually
stock *all* brands—of, say, ampicillin
or tetracycline—or how long they
keep "slow moving" products on their
shelves before they are returned for
credit. To ask that the industry elimi-
nate multiple sources is to ask com-
petitors to stop competing.

Drug Substitution—A License for the Unethical

Anti-substitution repeal would
favor "corner cutting" pharmacists
and manufacturers. For them, free
substitution would be not a right, but
a license. As an aftermath, it is quite
likely that the confidence of both phy-
sicians and patients in the profession
of Pharmacy would be eroded, as
revelations about the unconscionable
behavior of an undisciplined few were
magnified in the press or in profes-
sional circles.

Summary

In short, what the American
Pharmaceutical Association advo-

high drug costs to the public. An end-
less stream of propaganda has ema-
nated from the drug industry in an
effort to persuade the medical profes-
sion that these so-called anti-substitu-
tion laws should be retained. And as
long as these laws are retained, the
drug industry will continue its current
marketing practices which contribute
unnecessarily to high drug costs to
patients. These practices also are in-
viting government agencies to expand
their restrictive controls on physi-
cians and pharmacists.

APhA Efforts

As pharmacists, we are con-
cerned about health care costs. We
hope that every physician shares our
concern on this vital issue, and will
give his personal support to the con-
structive efforts APhA has undertaken
in the interest of all patients.

(For a complete discussion of
drug product selection, you are invited
to request a free copy of the "White
Paper on the Pharmacist's Role in
Product Selection" from: American
Pharmaceutical Association,
2215 Constitution Avenue, N.W.,
Washington, D.C. 20037.)

cates as a broad-spectrum panacea
looks to us to be not only a minority
view (advocacy of substitution is by
no means a uniform policy in Phar-
macy), but also an extraordinarily
costly and ineffective remedy, whose
side effects are odious. We believe
(1) that an impressive majority of
pharmacists prefer to work with
Medicine and with industry, for the
consumer, and for the general good,
(2) that they seek the privilege to sub-
stitute when the patient might gain
and when the patient's doctor agrees,
and (3) that they seek to work for the
resolution of genuine grievances
openly and professionally.

(For amplification of PMA views,
please write for our booklet, "The
Medications Physicians Prescribe:
Who Shall Determine the Source?"
It is available from: Pharmaceutical
Manufacturers Association, 1155
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D.C. 20005.)

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President's Letter

Medical Care for the Poor

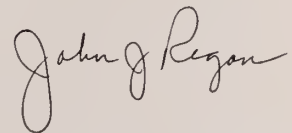
Recent editions of our metropolitan newspapers carried a story quoting a Minnesota political leader who was critical of the method of payment for medical care by several county welfare departments. On almost the same date, the New York Times in an editorial entitled, "To Save Legal Services" criticized the withdrawal of federal funding from the Office of Economic Opportunity's Legal Program for the Poor. It appears that political figures of different persuasions and different levels of government are interested in limiting and possibly even withholding both legal and medical services to the poor. In the opinion of our senator, the various welfare boards could save significant sums of money by paying physicians (and I presume hospitals, pharmacies, nursing homes and other providers) at cost and price levels of 1968. Two important questions were exposed to discussion—first, the inflation which is on our land and on our world. It would be pleasant to be able in 1973 to purchase physicians' services at 1968 levels. Indeed it would be pleasant for any of us to buy food, clothing, shelter or any other item at prices of some past time. The reality of the inexorable rise in costs of all goods and all services makes that simply impossible.

The second question at issue is *who will care for the poor and where will the poor receive care*. It is clear that the poor have already made that decision by abandoning their traditional sources of medical care and turning to the identical resources used by their more affluent fellow citizens. Care of the poor is an old tradition. Greek, Roman and Arabic society provided temples which were hospitals. Medieval society offered hospitals which were really places of refuge for the homeless and helpless. Less ancient history recalls such names as Bethlehem of London which gave a word to our language (bedlam), Hotel Dieu of Paris, the Philadelphia Alms House of the Society of Quakers. Current history included institutions such as Cook County Hospital, Bellevue, and the Charity

Hospital of New Orleans. Many of these places were distinguished for scientific virtuosity often at the expense of personal inhumanity. Many were part of our training years, and poignant memory recalls long lines of waiting poor, sitting with varying patience in innumerable rows of chairs in dark hallways.

I remember the story of a member of my family who while studying in Boston developed a mild respiratory infection. As a student he turned to the outpatient department of what its physician-director called "the world's greatest hospital." His harried tale includes hours in the waiting room, a cursory examination by a disinterested intern, inadequate treatment, all followed by a generous bill. No wonder the poor have turned away from institutional medicine. No wonder the welfare boards have besought the care of private physicians for their clients. The poor are demanding the same care, the same amenities and the same courtesy as the well to do. No longer will there be two standards—the consulting room for the affluent and the clinic for the poor. They have found that in a system of personal rather than institutional responsibility, medical care is not only more available but better.

The day of *liberté, égalité* and *fraternité* is at hand. That great ringing cry of 1789 has come booming down through the years. There is no turning back either in the provision of equal and excellent legal services or in the provision of equal and excellent medical services for all citizens any more than there is a turning back of prices or time to some bygone day.



President
Minnesota State Medical Association

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Fibercolonoscopy

JEFFREY R. LATTS, M.D.,* STUART H. BORKEN, M.D.†
ARNOLD KAPLAN, M.D.‡

FIBEROPTIC ENDOSCOPY of the upper gastrointestinal tract has proved its diagnostic usefulness and has become widely available over the past ten years. Among the more recent advances in fiberoptic instrumentation is the fiberoptic colonoscope which permits direct visualization of the colon well beyond that possible with the conventional proctosigmoidoscope.

Since 1970, an 80 centimeter colonoscope has been in use in the Gastrointestinal Endoscopy Unit at Mount Sinai Hospital in Minneapolis. This paper reviews the results of our first 67 examinations with this relatively new diagnostic technique.

Materials and Methods

The fibercolonoscope is a flexible tube, one centimeter in diameter, which can be introduced through the anus to examine the colon to a distance which varies with the length of the instrument (Figure 1). Light is conducted from a high intensity source through the length of the tube by fiberoptic material. Thus the field of vision is illuminated by cold light. The visual image is likewise transmitted back to the eye of the examiner through a separate fiberoptic bundle.

Channels extending the length of the instrument provide for air insufflation, suction, and introduction of a small stream of water. A separate channel is used to insert a biopsy cable or cytology brush cable for the collection of specimens where appropriate (Figure 2). Photographs can be taken by mounting a 35 mm camera on the eyepiece of the endoscope. The terminal segment of the instrument can be flexed in a 180° arc by rotating a knob at the operating handle in order to direct the instrument around angles and visualize mucosa.

We have been using the Olympus Colonofiberscope, Model CF-SB, an instrument which can be

inserted approximately 80 cm. into the colon. This length is adequate to examine the entire sigmoid colon in all patients and as far as the distal transverse colon in some.

The patient is prepared for the procedure with a purgative the evening before, 10 ozs. of citrate of magnesia, fasted thereafter,



Figure 1



Figure 2

*Intern, Veterans Administration Hospital, Los Angeles, California.

†Gastroenterology Fellow, Veterans Administration Hospital, University of Minnesota Hospitals, Minneapolis, Minnesota.

‡Clinical Assistant Professor of Medicine, University of Minnesota; Chief of Gastroenterology, Mount Sinai Hospital, Minneapolis, Minnesota.

See editorial, page 691.

and tap water enemas until the rectum is clear, the morning of the examination.

Examination is ordinarily performed with the patient in the left lateral decubitus position. Pre-medication is usually not required but in a small number of patients, the intravenous injection of alphaprodine hydrochloride (Nisentil®) or diazepam (Valium®) has been used to relieve abdominal cramping during the procedure.

The tip of the instrument is insinuated gently through the anus. A small amount of air allows easy identification of the lumen and insertion is then continued under direct vision. Negotiation of sharp angles is accomplished by flexing the tip and gently advancing while observing mucosa slipping by. Insertion is accomplished as quickly as possible. Careful observation, photography, and biopsy are performed during withdrawal.

Ambulant patients as well as inpatients referred from other hospitals are included in this report. Ambulant patients were allowed to leave the hospital soon after completion of the examination (with or without biopsy) unless they required medication, in which case they were detained until fully alert.

The 67 patients ranged in age from 18 to 90 years. Thirty-two were men; 44 were inpatients when examined.

Indications for colonoscopy are listed in Table 1. Three of the five patients recorded designated as "other" had a clinical course suggesting colitis but had a normal colon Xray. The two remaining patients were examined through a sigmoid colostomy: One of these to exclude undiscovered polypoid lesions (two unsuspected lesions were discovered at surgery) and one after diversion for apparent diverticulitis.

Results

Diagnostic results are compared with barium enema, the standard, universally accepted tech-

nique. Patients are divided into three groups based on concordance of findings with those of the corresponding barium enema. Group I consists of those patients where there was essential agreement between barium enema and colonoscopy. Group II patients had abnormalities on colon Xray which could not be confirmed endoscopically. Group III is composed of patients whose barium enema study was normal but in whose subsequent colonoscopy demonstrated pathology.

There are 47 patients in Group I. Eleven had normal studies and 36 had abnormalities which were seen both endoscopically and on barium enema examination. Biopsy was performed in several of these patients and the results are included in Table 2. Group I includes all cases of proved carcinoma, as well as two cases of chronic colitis. The remaining abnormalities were all benign polyps.

TABLE 2
BIOPSY RESULTS

Each biopsied lesion is included. Some patients have more than one lesion biopsied.

Adenomatous Polyp	14
Inflammation/Ulceration	18
Villous Tumor	4
Adenocarcinoma	1
Normal Mucosa	6
Ulcerative Colitis	2

The results in Group II patients are summarized in Table 3. Patient one was admitted with mild abdominal complaints and physical examination raised the question of a lower abdominal mass. Barium enema was interpreted as showing a questionable midsigmoid constriction. After the initial examination evaluation, re-examination did not confirm an abdominal mass. The patient was discharged from the hospital and has had no further followup. Patients Two, Five and Six had abnormalities diagnosed on barium enema which could not be confirmed endoscopically. In each case a second colon Xray was normal which supported the endoscopic impression. Cases Three, Four, Seven, Eight and Nine have had no further evaluation and the discrepancy between endoscopic and radiologic findings has not been resolved. Thus, in four of the nine cases in Group II, colonoscopy was of use in excluding suspected pathology and five cases remain unresolved.

There are eleven patients in Group III where colonoscopy revealed abnormalities not seen on barium enema. Four of these were patients with superficial colitis of unclassified type which had

TABLE 1
INDICATIONS FOR COLONOSCOPY

Abnormal Barium Enema		44 patients
Polypoid lesion	17 patients	
Constricting lesion	11	
Mass lesion	8	
Colitis	5	
Suspected fistula	1	
Single colon ulcer	2	
Rectal Bleeding		18
Other		5
TOTAL		67

TABLE 3
Barium Enema Findings Not Confirmed At Colonoscopy
(Group II)

Patient	Barium Enema	Colonoscopy (numbers in parenthesis refer to length of colon examined, where less than 70 cm.)	Corroborative Evidence
1	Slightly contracted mid sigmoid colon	Several tiny polyps. No constriction.	Resolution of suspected abdominal mass
2	Stricture of sigmoid colon	Normal	Normal repeat Xrays
3	Polyp, distal descending colon	Normal (60 cm.)	None
4	Constriction and possible mass in sigmoid colon	Normal	None
5	Distal sigmoid constriction	Normal	Normal repeat Xrays
6	Colovaginal fistula	Normal (55)	Normal repeat Xrays
7	Sigmoid constriction	Normal	None
8	Descending colon polyp	Normal	None
9	Sigmoid polyp	Normal	None

caused an acute episode of bleeding. Biopsies confirmed the presence of inflammation but were not helpful in classifying the colitis as to type. In two, biopsies and endoscopic appearance were considered diagnostic of ulcerative colitis. One patient was examined following substantial bleeding per rectum. Proctoscopy and barium enema were negative. Subsequently at colonoscopy a small polypoid lesion and a linear ulcer were noted within 10 cm. of the anus. Repeat proctoscopy confirmed these findings.

Forty-nine biopsies were taken in 40 patients. All but 14 of these were obtained from levels above the reach of the proctosigmoidoscope. The results of these biopsies are classified in Table 2. There were eight cases in which the visual impression at endoscopy was carcinoma and biopsy was confirmatory in six.

Seven of these patients had carcinoma at sur-

gery, and the remaining patient, thought to have recurrent carcinoma, had a benign lesion at surgery (endoscopic biopsy was also benign).

There were no serious complications of colonoscopy or biopsy in this series. An occasional patient reported prolonged crampy abdominal pain lasting several hours, probably related to insufflation of a large volume of air. Bleeding from biopsy sites was minimal in all cases.

Comment

The usefulness of endoscopic visualization and manipulation of colon lesions has already been demonstrated by the widespread application of proctosigmoidoscopy. Only the lower 25 centimeters or so of colon has been accessible until recent availability of flexible fiberoptic devices for use in the colon.

Colonoscopy in the patients reported herein, has been a useful diagnostic tool and seems particularly valuable in the evaluation of: (1) Sigmoid constrictions, which may be either inflammatory or neoplastic based on roentgenologic appearance; (2) Inflammatory disease involving the colon above the reach of the proctoscope, where the barium enema may be normal to minimally abnormal and (3) Cases of lower gastrointestinal hemorrhage. Diagnostic accuracy of the small biopsies taken from the surface of polypoid lesions has not been determined but relatively good results have been obtained thus far. Shinya's technique for perendoscopic removal of polypoid lesions seems to be an important advance but has not become widely available as yet.¹

Although colonoscopy has not found the firm place in diagnosis that peroral endoscopy has, it is a promising technique which will undoubtedly find increasing use in disease of the colon especially since the recent development and availability of longer instruments which have a greater degree of controlled tip flexibility.

References

1. Wolff WJ, Shinya H: Colonofiberoscopy. *Amer J Surg* 123:180, 1972.

State Board of Medical Examiners

Effective August 1, the new address of the Minn. State Board of Med. Examiners will be: Suite 203 Minn. State Bank, 200 So. Robert St., St. Paul, Minnesota 55107.

Drug Fever Caused by Quinine and Quinidine

MICHAEL SCHLUTZ, M.D.*, HORACE H. ZINNEMAN, M.D.* and
WENDELL H. HALL, M.D.*

DURING THE PAST 36 months the Infectious Disease Section of the Minneapolis Veterans Administration Hospital had the opportunity to observe four patients with obscure fever, soon recognized as drug fever, two of them due to quinine and two caused by quinidine. Quinine was administered for a febrile illness, and the recurrence of fever might easily be taken as a sign of ineffectiveness of the drug.

Case Reports

Case 1

A 58-year-old small business owner was referred to Minneapolis Veterans Hospital (MVAH) for evaluation of recurrent episodes of high fever. Thirty years before he had malaria while serving in the Pacific during World War II. One year later he had another attack. He was treated both times uneventfully with quinine and had been without complaints until 1970, when he sustained a myocardial infarction. After three weeks in a hospital he was discharged with prescriptions for digoxin and quinidine sulfate, the latter to be taken whenever he became aware of irregular heart beat. He soon developed alarming episodes of the following constellation of symptoms: Severe cramping of both quadriceps femoris muscles and lower abdominal pain, followed by nausea, vomiting, watery diarrhea and finally chills with fever of 104°F. The episodes subsided after several hours, and occurred at almost monthly intervals for more than one year.

In November 1972 he was referred to MVAH immediately after sustaining a typical attack. He was found to be pale but not in acute distress. His oral temperature was 104°F. The physical examination did not reveal any remarkable findings. The initial laboratory data included a white blood count of 10,700/cu mm, and the differential count showed a shift to the left with 87% neutrophils and 9% stabs. Cultures of blood, urine, pharynx and sputum were normal. Thick and thin blood smears were negative for malaria.

Further questioning revealed that he had been treating an intermittent tachyarrhythmia with digoxin 0.25 mg

and quinidine sulfate 400 mg. He had taken these medications earlier on the day of admission, about two hours prior to the acute attack of his illness, but was unable to correlate previous febrile attacks with this medication.

After three days of well-being he was challenged with 400 mg of quinidine sulfate. Two and one-half hours later he developed shaking chills. His temperature rose to 102.6°F and cramping of the thighs and abdominal pain, watery diarrhea, nausea and vomiting followed soon thereafter. One hour and 45 minutes later the temperature had risen to 105.4°F. Thereafter all symptoms abated and by evening of the challenge day the patient was afebrile.

Case 2

Ten days prior to his admission to MVAH this 44-year-old garage mechanic had suffered vague chest pain followed by rapid, irregular heart action, which persisted to the time of his admission.

The patient was found to be perspiring profusely. Blood pressure was 137/76 mm Hg. Pulse rate was 120/minute and irregularly irregular. The temperature was 98.4°F. There was no exophthalmos nor lid lag, and the visual fields and fundi showed no abnormalities. The thyroid gland was diffusely enlarged. Except for a fine tremor of the extended fingers, other physical findings were unremarkable.

Laboratory findings included normal blood counts and urinalysis. The I^{131} uptake was 46% in 24 hr, the basal metabolic rate was 5% and the protein-bound iodine 5.9 mg/100 ml. The chest roentgenogram demonstrated borderline cardiac enlargement, and an electrocardiogram showed rapid atrial fibrillation and left ventricular preponderance. After digitalization the heart rate slowed to 80/minute and conversion of the atrial fibrillation was attempted with quinidine sulfate, 180 mg being given every two hours for five consecutive doses. On the following day he was given 240 mg of quinidine followed by four doses of 180 mg at two hour intervals. Thereafter he received a maintenance dose of 180 mg of quinidine three times daily. Three days after the beginning of the maintenance dose he developed a fever of 100.4°F, which spiked at times to 106°F.

The fever subsided promptly after cessation of the quinidine. One week later the patient was given a test dose of 180 mg quinidine. Four hours after administration he developed abdominal pain, nausea, vomiting, headache, chills and fever to 102.4°F. All these symptoms disappeared within 48 hours. The patient was discharged in sinus rhythm.

*Department of Medicine, Veterans Administration Hospital, and the University of Minnesota Medical School, Minneapolis.

Reprint requests to Veterans Administration Hospital, 48th Avenue South and 54th Street, Minneapolis, Minnesota 55417. (Dr. Zinneman).

Case 3

A 19-year-old soldier had experienced several chills with fever, nausea and vomiting prior to his return to the United States on an emergency leave. *Plasmodium falciparum* had been found in his blood smear while he was in Vietnam, and treatment with quinine had been initiated. His symptoms did not abate after four weeks of this therapy. Two days after his return to the United States he was referred to MVAH.

Upon admission his temperature was 101°F. His spleen tip was palpable. The physical examination was otherwise unremarkable. Routine laboratory studies, including thick and thin blood smears for malaria, were negative. Quinine therapy, which had been originated in Vietnam, was continued, but the fever persisted with spikes up to 103°F. Blood smears for malaria continued to be negative, and the quinine therapy was stopped on the fourth day. The fever quickly disappeared and the patient remained afebrile for six days. Blood smears continued to be negative for malaria. On the seventh day he was challenged with a single dose of 300 mg of quinine sulfate. Six hours later he developed shaking chills and fever of 104°F. The fever abated within 36 hours and did not return. The patient was discharged without medications and cautioned against the further use of quinine.

Case 4

A 22-year-old soldier was admitted to MVAH two weeks after leaving Vietnam. En route to the United States he complained of sore throat, mild fever, diarrhea, nausea and vomiting. These symptoms remitted after five days, only to recur two days prior to admission with four episodes of fever to 104°F, rigors, profuse diaphoresis, headache and myalgia.

While in Vietnam he had been taking suppressive malaria therapy of chloroquine 500 mg and primaquine 5 mg once weekly and dapsone 500 mg once daily. Oral tetracycline had been administered just prior to his hospitalization. In the remote past penicillin therapy was followed by urticaria. Upon admission his temperature was 102°F. Heart and lungs were unremarkable to percussion and auscultation, and a chest roentgenogram showed no abnormalities. The spleen tip was palpable and mildly tender. The prostate gland was somewhat enlarged, tender and soft. Laboratory data on admission showed normal hemoglobin level, white blood cell count and differential, but only 103,000 platelets per cu mm. Thick and thin blood smears were at first negative for malaria. On the third hospital day trophozoites and gametocytes of *P. falciparum* appeared in the smears, and treatment with quinine (600 mg t.i.d.) and pyrimethamine (25 mg t.i.d.) was begun. Quinine was to be given for a period of two weeks, whereas pyrimethamine was to be administered for three days.

Immediately on the first evening the patient complained of epigastric burning sensation, vomiting and dyspnea. During subsequent days he complained of nausea and weakness following each dose. On the tenth day he was afebrile, and the peripheral white blood cell count showed mild eosinophilia (5%). Quinine was stopped, and the fever disappeared after 24 hours. Malaria smears con-

tinued to be negative, and the patient was discharged with advice concerning quinine sensitivity.

Discussion

The febrile episodes of these four patients occurred at least three days after the initial administration of cinchona alkaloids. Thus, they represent true drug sensitization and not idiosyncrasy, which would manifest itself after the first dose of the alkaloid.

Unlike pharmacologic effects of large doses of these alkaloids,^{1,2} drug fever appears to be associated with the duration of administration rather than the total or daily dose. Fever was the only manifestation of drug sensitization in the two patients who received quinine, whereas the patients to whom quinidine was administered, also had gastrointestinal manifestations. This is by no means a characteristic difference, since quinidine sensitization also has been reported with fever as the only or the most prominent manifestation.^{3,4} The first patient in our report manifested complaints similar to the one patient reported by Siegel et al.⁵

The common features of the four reactions reported here were as follows: Prior use of the drug and/or administration for a duration of a period from three to 30 days, abatement of all symptoms when administration of the drug was stopped, and in three of the patients return of the same manifestations within a few hours of renewed administration of the same medication.

None of our patients developed hemolytic anemia⁶ or thrombocytopenia purpura.⁷ These manifestations have been described repeatedly and are thought to be the consequence of absorption of the alkaloid or its metabolite to erythrocytes or thrombocytes, thus forming an antigenic combination. Hemolytic anemia or thrombocytopenic purpura may then follow in the presence of complement.⁷

Sensitization to quinine does not necessarily imply sensitivity to quinidine. Such a cross-reaction is in the realm of possibility. Dawson's demonstration of cross reactivity of the levo-isomer quinine with cinchonine, which is a dextro-isomer, was observed in a patient with an idiosyncratic reaction rather than an antigenic sensitization.⁸ To date we have little information whether such a cross-sensitization actually exists.

Whether quinine or quinidine are administered alone or in conjunction with other drugs, the awareness of these alkaloids as causes of drug

fever will be helpful, particularly when, as in the treatment of a febrile illness. case of quinine, the medication is given for the

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Kleine-Levin Syndrome

This syndrome is characterized by periodic attacks of hypersomnia and abnormal hunger. It was described by Kleine in 1925 and by Levin in 1929 and 1936. The condition has been observed mainly in males 20 to 30 years of age.

The attacks may occur at intervals of a few months with a duration of two to three days or occasionally a few weeks. The patients are apparently normal between attacks. The hypersomnia may appear as a normal or abnormal manifestation. In one reported case, the patient slept like a child during an 11-hour period of continuous bombing of Coventry, England. In other instances the accompanying features may include motor unrest, irritability, gastrointestinal hypermotility, mild mental confusion, incoherent speech, and hallucinations.

The etiology is not known. The syndrome has been reported to occur after acute febrile illness, nonepidemic encephalitis, head injury, and cerebellar tumors. It has been suggested that a lesion within or near the hypothalamus may be responsible, although morbid hunger has also been observed in lesions of the frontal lobe. Glucose and insulin tolerance tests were usually normal, and there was no evidence to suggest the presence of a pancreatic tumor. Electroencephalographic studies were also usually normal, although abnormalities were observed in three cases, one of which revealed the characteristic spiking seen in epilepsy.

Although the syndrome apparently belongs in the narcoleptic group of disorders, it differs from narcolepsy in its characteristic periodicity, the presence of abnormal hunger during attacks, and the absence of cataplexy and disordered nocturnal sleep. Treatment is symptomatic. Cerebral stimulants may be tried for the hypersomnia.

Durham, Robert H.—*Encyclopedia of Medical Syndromes*
Hoeber Medical Division, Harper and Row, New York

Minnesota Society of Clinical Pathologists

Minnesota Society of Clinical Pathologists, Annual Tumor Seminar, September 10, 9 a.m. to 5 p.m., Minnesota Club, St. Paul. Program chairman: Edward Soule, M.D., Mayo Clinic, Rochester 55901. Speaker: Gerald Fine, M.D., Henry Ford Hospital, Detroit, Michigan, Slide Seminar.

Foramen of Morgagni Hernia

PER WICKSTROM, M.D.* and HOVALD K. HELSETH, M.D.*

MORGAGNI DESCRIBED the hernia which bears his name in 1769.¹ These hernias are now recognized to result from a retrosternal, probably congenital, defect in the attachments of the diaphragm to the sternum and thoracic cage. The point at which the hernia occurs is usually marked by the passage of the superior epigastric artery through the diaphragm. The Morgagni hernia is quite rare. It makes up about three percent of all diaphragmatic hernias. A physician could practice a lifetime and not come across one. The diagnosis is not difficult and, if suspected, the patient can receive prompt surgical correction without undue physical or financial suffering. An illustrative case is presented here as a reminder.

Case Report

A 27-year-old moderately obese woman was admitted to Hennepin County General Hospital in September 1972 with left-sided pleuritic chest pain. On the basis of low PA O₂ and a lung scan which showed a defect in the lingula, the presumptive diagnosis of pulmonary embolism was made and the patient was anticoagulated.

On the admission chest film there was a large mass

at the anterior right cardiophrenic angle (Figures 1A and 1B). Another smaller mass was seen behind the heart in the posterior mediastinum. The posterior mediastinal mass had been noted on a 1968 chest film when the patient was hospitalized for childbirth. At that time it was thought to be benign and had not changed since. The larger, anterior right thoracic mass was not present in 1968.

A barium enema (Figure 2) and an upper gastrointestinal series were done. The barium enema showed the transverse colon to be pulled upward; the upper G.I. was normal. The patient was discharged on anticoagulants with the diagnosis of pulmonary embolism, benign posterior mediastinal mass and probable foramen of Morgagni hernia.

The patient was readmitted after her course of anticoagulants in November 1972 for elective surgery. Through a midline epigastric incision the foramen of Morgagni hernia could be visualized easily (Figure 3). The hernia contents consisted of omentum and this was reduced (Figure 4). The preperitoneal fat also constituted a mediastinal hernia mass and could explain the long standing lower mediastinal mass. There appeared to be both a peritoneal and pleural sac which were ligated and excised. The diaphragmatic fibers were approximated with several interrupted permanent sutures.

The patient was alimenting and ambulating by the second postoperative day and was discharged on the fourth day.

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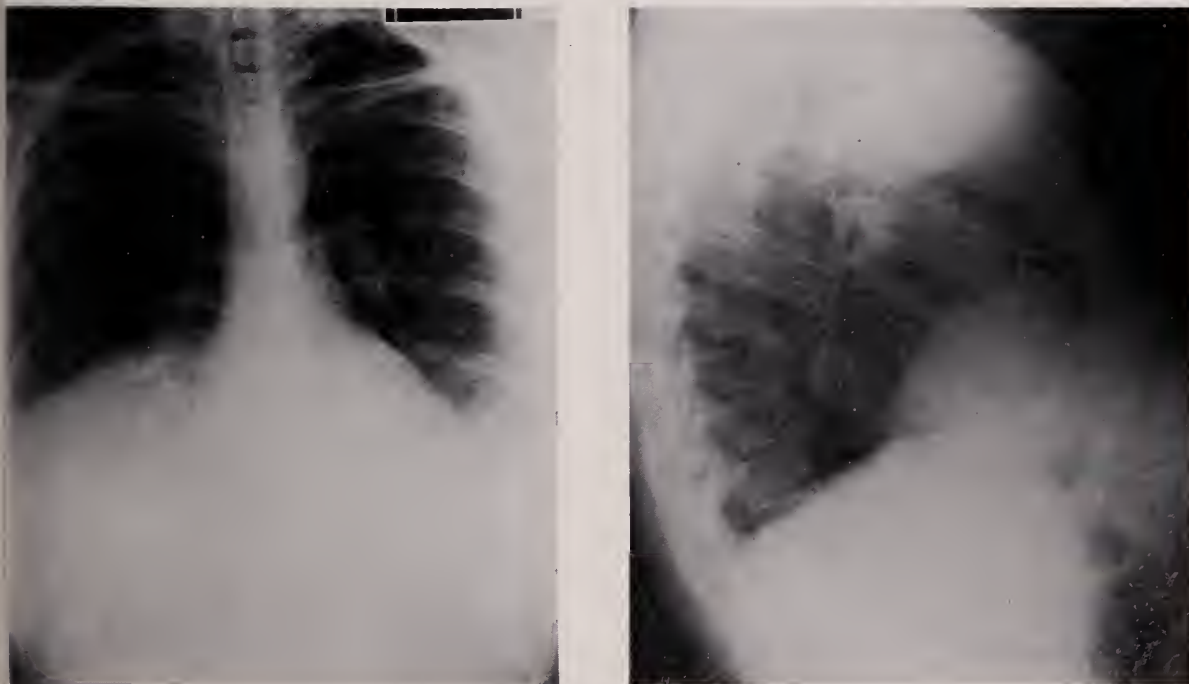


Fig. 1—Preoperative chest film (Left) PA, (Right) Lateral.



Fig. 2—Preoperative barium enema.



Fig. 3—Intraoperative photograph. The omentum pulled up through the foramen of Morgagni (beneath the Richardson retractor).

Her postoperative Xray showed the anterior right cophrenic angle mass to be gone. The posterior mediastinal mass remains (Figures 5A and 5B) but is smaller and its configuration is altered.

Discussion

This case is typical in several respects. The patient is an obese female. Obesity is considered an important precipitating factor,⁴ and seven out of ten people presenting with the Morgagni hernia are women.^{3,4} This patient's hernia presented in the right anterior thorax as is the usual case. She was asymptomatic, as are most.^{5,6} Her hernia was while most likely congenital in etiology, was not detected until adulthood. Morgagni hernias may be seen in the pediatric age group⁶ but most are found after middle age.

Not all Morgagni hernias are without symptoms. Gastrointestinal symptoms such as epigastric distress, fullness, constipation, eructation, and flatulence are mentioned. Respiratory symptoms, such as cough and shortness of breath, are also reported in some patients.^{3,4} The colon is usually included in the hernia contents, but symptoms of bowel obstruction are rare. Abdominal organs most com-



Fig. 4—Intraoperative photograph. The omentum reduced. The upper retractor is in the foramen of Morgagni.



Fig. 5—Postoperative chest film. (Left) PA, (Right) Lateral.

only found in Morgagni hernias, as listed in increasing frequency by Comer and Clagett,³ include omentum, colon, stomach, liver and small bowel.

The key to the diagnosis is the chest film which reveals a right-sided smooth, anterior hemithoracic mass. Left-sided hernias and bilateral hernias occur but are unusual.^{2,3} The differential diagnosis includes such conditions as pericardial cysts, pleural cysts, mesothelioma, lipoma, lymphoma, teratoma, thymoma, and bronchogenic carcinoma. Barium enema proves helpful since the hernia often contains transverse colon as reported by

Comer and Clagett in 30 of their 50 patients.³ When it does not, an upward deformity of the transverse colon might be noted, as in the case presented here. Other studies which have been recommended are the upper gastrointestinal series and pneumoperitoneum.^{5,6}

If the diagnosis can be made with some certainty, the repair can be accomplished through a small epigastric incision. If not, the right chest might be explored and the repair done from above. The former approach is not only easier for the surgeon but also for the patient, in terms of postoperative morbidity and length of hospital stay.

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Cancer Seminar

September 19, Seminar on Modern Concepts in Cancer Therapy sponsored by Methodist Hospital, Minneapolis, in conjunction with the Minnesota Cancer Society will be held at Methodist Hospital. Contact: Dr. John Flinn at Methodist Hospital.

Leukapheresis in the Management of Chronic Leukemia

I. E. FORTUNY, M.D.*, L. CRANDALL, M.D.†, J. McCULLOUGH‡, A. THEOLOGIDES, M.D.# and B. J. KENNEDY, M.D.§

THE ONSET OF chronic leukemia may be insidious and prolonged asymptomatic periods occur. The occurrence of symptoms appears to depend upon the extent of the total accumulated white blood cell mass. Especially in chronic lymphatic leukemia, long periods of observation have been made of asymptomatic disease without therapy.

In chronic myelogenous leukemia cyclic oscillations of granulocytes and platelets have been demonstrated in some patients prior to and during chemotherapy.^{2,8} These cycles have been observed for years (Figure 1, Phase I) until cell removal mechanisms begin to fall behind the cell production rate (Figure 1, Phase II). As cells accumulate in the normal granulocyte pool (bone marrow, spleen and liver), the cell removal mechanism becomes ineffective, and Phase III of the disease is entered (Figure 1). Studies of this phenomenon offer the possibility of further understanding the leukemic process and introduction of new concepts of therapy.

It was postulated that mechanical removal of white blood cells by leukapheresis would permit the recovery of an effective cell removal mechanism, with a resulting symptom free physiologic steady state. The effect of repeated leukapheresis in 12 patients with chronic lymphocytic leukemia, reported by Curtes,⁶ documented objective evidence of regression of disease in 10 of the 12 patients. These investigators considered leukapheresis a potentially useful treatment with chronic

lymphocytic leukemia. Vallejos, studying 10 previously untreated patients with chronic myelogenous leukemia reported reduction in spleen size and peripheral leukocyte counts of greater than 50% in a majority of patients following leukapheresis. In view of these findings, further study of the effect of leukapheresis in chronic leukemia utilizing the blood cell separator was indicated.

Methods and Materials

The Aminco Celltrifuge[™] is operated at the Masonic Memorial Cancer Hospital by the Section of Medical Oncology in cooperation with the Blood Bank of the University Hospitals. The apparatus provides the opportunity to remove specific blood cell components from patients or normal donors. The procedure is described elsewhere.¹

Patients with chronic leukemia were selected for study by leukapheresis because of the presence of high volumes of white blood cells. Inform-

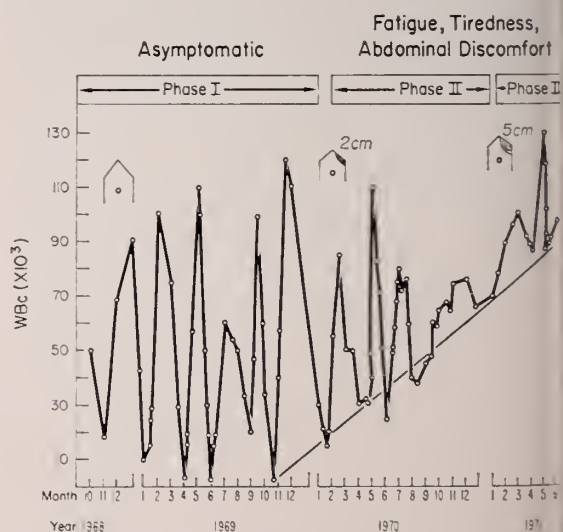


Fig. 1—(Case 1). Granulocyte cycling in an untreated patient with chronic myelogenous leukemia.

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[™]American Instrument Company.

consent was obtained from the patients as human volunteers. Ambulatory patients were managed on an outpatient basis.

Results

Chronic Lymphatic Leukemia

A 61-year-old physician with chronic lymphatic leukemia, after five years of management with chemotherapy became refractory to treatment. Because of increasing leukocytosis, total body irradiation was given every two months over the next two years with moderate control of symptoms but not of the leukocytosis. Because of increasing hepatomegaly, lymphadenopathy and leukocytosis of 700,000 per cmm, all indicating progressive accumulation of lymphocytes, removal of lymphocytes from the body sanctuaries was considered feasible by leukapheresis.

During a series of 21 leukapheresis procedures over 72 days, there was a reduction of the white blood cell count from over 700,000 to around 100,000 per cmm (Figure 2). The platelets increased, the liver decreased in size, but the enlarged lymph nodes remained unchanged. The patient experienced significant symptomatic improvement.

Chronic Myelogenous Leukemia

The effect of leukapheresis was studied in five patients with chronic myelogenous leukemia.

Case 1

A 15-year-old girl had been found to have periodic cycles of leukocytosis while she was followed for 2½ years without treatment (Figure 1). After 18 months, when the leukocyte count failed to return to baseline levels during each cycle, tiredness, fatigue and splenomegaly became more pronounced. These signs and symptoms were

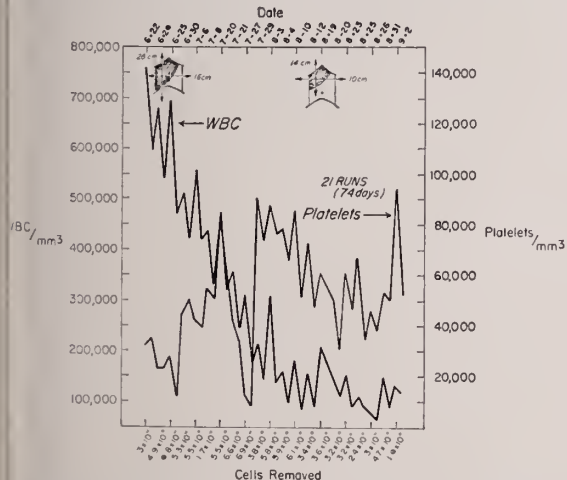


Fig. 2—Leukapheresis in a male with chronic lymphatic leukemia refractory to chemotherapy and radiotherapy.

the result of progressive accumulation of the white blood cell mass. Leukapheresis was begun and the peripheral leukocyte count was reduced to a level below 20,000 cells per mm^3 (Figure 3). Twelve leukapheresis procedures performed over an eight week period resulted in removal of over 190 billion leukocytes. Subsequently, there was a rise in the hemoglobin and maintenance of the leukocyte count in the 20,000-40,000 range for 10 months after leukapheresis, without chemotherapy. However, in the 11th month, the spleen became palpable and the nadir of the granulocyte counts surpassed 60,000 cells/ mm^3 (Figure 3).⁸ Leukapheresis was again carried out decreasing the leukocyte count to the previous low levels. The patient has remained well for eight months, more than 22 months since her first leukapheresis.

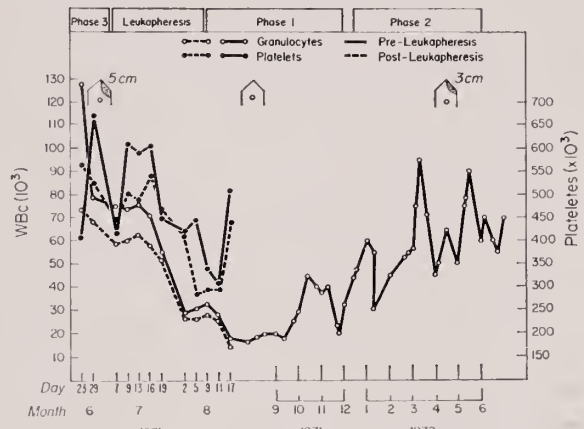


Fig. 3—(Case 1). Leukapheresis in cyclic leukocytosis of chronic myelogenous leukemia.

Case 2

A 64-year-old man was followed without treatment for 1.5 years and a definite cycling of the white blood cell count was observed (Figure 4). When the white blood cell count exceeded 100,000 per mm^3 fatigue, tiredness and splenomegaly were noted. The use of leukapheresis was undertaken. He was withdrawn from study after only two leukapheresis procedures because of a traumatic injury at home resulting in a subdural hemorrhage that contraindicated the further use of leukapheresis.

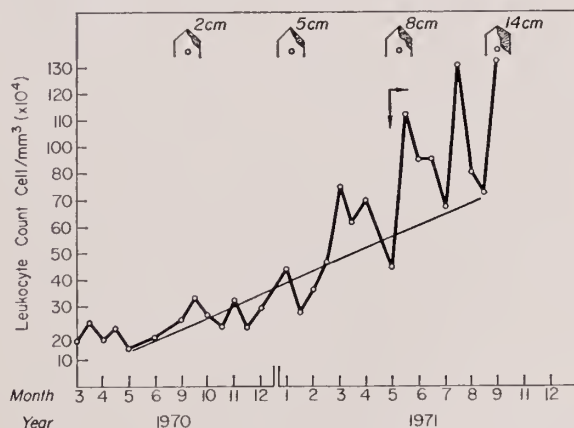


Fig. 4—(Case 2). Cyclic leukocytosis in untreated chronic myelogenous leukemia.

Case 3

In a 26-year-old woman symptoms due to massive splenomegaly prevented study of the cyclic phenomenon of leukocytes and immediate treatment was required. Leukapheresis was carried out five times weekly for eight weeks in an attempt to reduce the stores of leukocytes. Although there was a temporary reduction of the spleen size, a rebound in the peripheral white blood cell count occurred with a rapid increase in the size of the spleen. Hence, leukapheresis was discontinued.

Case 4

A 53-year-old woman had been successfully managed with hydroxyurea therapy for nearly two years. Because of escape from this therapy, leukapheresis was initiated. After nine procedures, fever, painful massive splenomegaly, and leukocytosis continued. The program was discontinued.

Case 5

A 38-year-old woman with anemia and massive splenomegaly due to chronic myelogenous leukemia was submitted to leukapheresis. Two courses of hydrea, 80 mg per kg per day, were given to decrease the leukocytosis and thrombocytosis. After 34 procedures the abnormal hematologic parameters improved, however there was no reduction in spleen size (Figure 5). Therefore the leukapheresis was discontinued and maintenance chemotherapy using hydrea was begun.

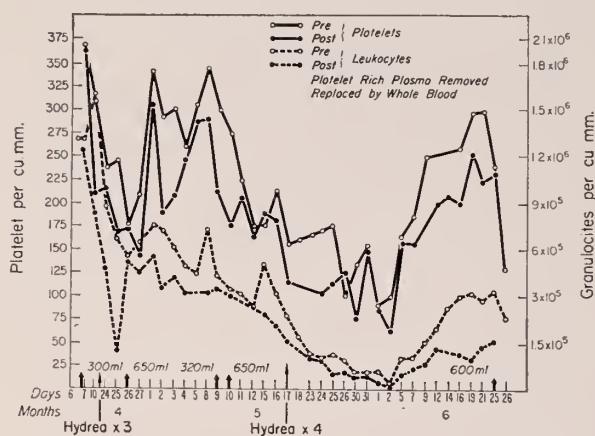


Fig. 5—(Case 5). Leukapheresis in non-cyclic chronic myelogenous leukemia.

Discussion

The cell separator apparatus provides an unusual opportunity to study chronic leukemia by removal of large stores of leukocytes in a short period of time. Preliminary reports by Freireich and his associates^{6,7} suggested promising potential for the management of chronic leukemia by this method. Careful evaluation of their data shows that complete remissions did not occur.

Our observations in six patients were varied depending on the extent of the disease. The results of leukapheresis suggested that in the symptomatic stage (Phase III), only a partial, temporary improvement to Phase II can be induced, failing to return the patient to a physiologically steady state (Phase I). The changes in Case 1, suggest that leukapheresis in the earlier phases of the disease might well induce a physiologically steady state.

Leukapheresis in the management of chronic myelogenous leukemia suggests that leukocytosis is not unrelenting, provided the cell removal mechanisms are effective. Mechanical aid in cell removal may provide a useful means to decrease white cell mass which the normal removal mechanisms are no longer able to dispose of. By decreasing the over-expanded pool of granulocytes mechanically, cycling may be allowed to continue (Phase I) a sign of adequate physiologic control, therefore postponing the need for the use of chemotherapeutic agents.

Cell kinetic studies before, during, and after leukapheresis will undoubtedly shed further information regarding the basic defect in the pathogenesis of chronic myelogenous leukemia. Although leukapheresis is an experimental procedure, it could prove to be the initial approach in the long term management of chronic leukemia, by aiding the granulocyte removal mechanisms to effectively dispose of the load as they appear to do in Phase I of the disease.

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Psychosomatic Disorders

Combined Therapeutic Approach

ALAN H. ROSENBAUM, M.D.* and RICHARD M. STEINHILBER, M.D.*

THE MANAGEMENT of patients with psychosomatic (pseudophysiological) disorders is often difficult. As many papers have emphasized, the diagnosis of such disorders is not easy;¹⁻⁴ but diagnosis can be made easier by identifying certain characteristics of patients who tend to somatize their emotional conflicts.^{3,5,6} Treatment also may be a problem. Although treatment is more successful than it used to be—these patients once remained physical cripples—still treatment often fails. Attention to ways of improving the diagnosis and treatment of patients with psychosomatic disorders is therefore important.

We report four case histories to illustrate the difficulties in diagnosing and treating patients who have psychosomatic disorders and organic disease with psychogenic overlay. These case reports further illustrate some of the underlying psychodynamics and the need these patients have for their symptoms. But most importantly, they emphasize the importance of unity between referring doctor and psychiatrist in providing the patient the best opportunity for successful treatment. Although the problems are primarily those of back pain, we recommend the same approach be used for most pseudophysiological disorders.

Report of Cases

Case 1

A 37-year-old woman was evaluated for low back pain and for possible use of a body cast. Her pain had begun three years before admission. Myelography then revealed a protruding disk, and six months later she consented to laminectomy and fusion. Her symptoms then abated. One year prior to admission she was in an automobile accident and immediately her symptoms recurred. Roentgenographic studies showed that the fusion was intact and the result of myelography was normal. The patient quit her job and became almost totally disabled. She became addicted to drugs and was admitted to our psychiatric unit because of this. Two psychiatrists thought

the patient to be an emotionally stable person who became addicted because of physical pain. An orthopedic consultant confirmed the previous findings and recommended no further surgery; he also told the patient that a body cast would not help. Confronted with the fact that her pain had a psychogenic as well as organic basis and that she had to live with it, the patient chose to accept psychotherapy together with physical therapy.

The patient's history indicated a life-long pattern of turmoil. Her parents had separated when she was young. Her mother was an abusive alcoholic and, at her mother's behest, the patient assumed the maternal role. She married to escape her mother's household. She did not feel sexually adequate and her husband reinforced this. She had had one affair and was tempted toward another, but back pain kept her from having the affair and also prevented her from having relations with her husband. This was the primary gain or her way of diminishing the anxiety of the intrapsychic conflict (her temptation as opposed to her moral standards). Her background made her susceptible to the conflicts to which she eventually succumbed. Not having the strength (that is, adequacy of self-image and the ability to deal with her desires and hostility) to cope with these conflicts, she chose a physical symptom, which had to some degree an organic basis.

After eight weeks the patient returned home. She was taking no drugs and was able to get a job and resume her household activities. She separated from her husband. She was doing well when seen six months later.

Case 2

A 59-year-old woman had a seven-year history of severe low back pain and of many surgical procedures, including three lumbar fusions and a percutaneous cordotomy. These did not relieve the pain. Eight months prior to admission she was treated with analgesics in the hospital for six weeks. Two months later her pain again worsened so that she was unable to function, and required oxycodone compound (as Percodan) and pentazocine (Talwin). Two weeks before admission, a physical examination indicated that there was no further need for any surgical procedure. The patient was transferred to the open psychiatric unit where she insisted for 10 days that nothing was wrong. During the final confrontation, she tried to look at some of her home life and it became obvious that her marriage was unhappy. Her back pain had begun some 30 years earlier, when she fell down the stairs while six months pregnant. This occurred

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shortly after her husband had fondled a woman while the three of them were lying in bed together. The patient's back pain was her way of avoiding her rage at her husband and further kept him from getting near her. This pain became more severe as further conflicts arose.

Her symptoms subsided to a point where she began walking and stopped taking analgesics. She was transferred to the Intensive Psychotherapy Center, which she attended with her husband. Marital counseling ensued.

Case 3

A 53-year-old woman had a history of persistent back and neck pain of 20 months' duration. Pain had begun after her automobile had been hit by an unattended car that rolled into the street. The neck pain began three days later, initially in the posterior cervical area, and radiated to the left shoulder, posterior arm, forearm, and fourth and fifth fingers. There was numbness and weakness of the left hand. Several days later pain began to radiate from the low back region to the lateral parts of the thighs. No neurologic deficit was elicited. The pain, both in the neck and back, was treated conservatively. One month later a myelogram showed evidence of disk protrusion at the C-6 and C-7 interspace. The disk was excised and a cervical fusion was done. This operation did not relieve the pain, which in fact intensified. Six months later, reevaluation provided no evidence of any neurologic defect; findings included an intact cervical fusion, and a lumbar pseudospondylolisthesis of L-4 and L-5 due to degenerative changes of the lumbar vertebrae. The orthopedist recommended physical therapy and psychotherapy but also told her she would need a lumbar fusion within the next year.

The patient was admitted to the open psychiatric unit for two weeks. Her history elicited the following: She came from a broken home. Language problems made her early schooling difficult and financial problems prevented her attending college. Her husband had had a myocardial infarct seven years earlier and became an invalid; she had to take over all of his duties. One year before her admission, the husband had undergone a coronary bypass procedure and was able to go back to work. She was seen by a psychiatrist at that time for anxiety and depression; her symptoms abated following this initial consultation. Soon after the car accident occurred she became almost totally incapacitated. While in the hospital, however, she insisted she had no feelings about her husband's illness, nor about the stress placed on her by her son—a "genius" who practiced the piano until 4:00 a.m. and had her type his papers until late at night. She said that her doctor had stated that surgery was necessary and that it would relieve her symptoms (partly this reflected her misinterpretation and partly the message he conveyed) and that she had nothing to talk about.

The patient's symptoms were her way of dealing with her rage at her husband and family. She could not consciously justify her anger since she knew that her husband's illness was real; furthermore, realizing that she herself had been deprived of a chance to achieve academic success, she wanted her son to succeed. Simultaneously she was again deprived of the normal dependency needs related to marriage—as she had been while

a child; the deprivation rekindled the pent up anger from the past. She was not able to express these feelings as a child and still lacked the necessary expressive tools to deal with them as an adult.

Neurologic and orthopedic reevaluation was done six months after discharge, and she was then dismissed with the diagnosis of functional back pain.

Case 4

A 36-year-old man had had numerous somatic complaints for two years before we evaluated him. His symptoms began when he fell and injured the lower part of his back. Three days later, he noticed pain in the costo-vertebral angle and hematuria. The hematuria cleared up but one month later the low back pain necessitated treatment in the hospital with bed rest and traction. He was unable to work following discharge. A myelogram, two months later, was followed by surgical exploration of his spine. No protrusion of the disk was found. The postoperative course was complicated by foot drop and associated paresthesias and, four days after operation, by sweating and tachycardia on sitting. A month later, tachycardia occurred every morning also; he was afraid to leave the house. During that month he lost 11.3 kg (25 lb) in weight. Methylprednisolone (as Depo-Medrol) was given two months later. Pain in both legs then developed and he complained also of alternating urinary retention and polyuria. He was treated with thioridazine (Mellaril) but then complained of edema of both legs and of impotence. Six months later, while driving, he noticed the onset of amblyopia and tachycardia. He was again hospitalized. While in the hospital a urinary tract infection developed, with temperature of 39.4 C (103 F); he received antibiotics and diazepam (Valium). After a further six months all medications were stopped; his symptoms recurred, with priapism early in the mornings in addition. Investigations included a glucose tolerance test, which was normal. A psychiatric consultation was requested. The patient stated that the psychiatrist found nothing wrong with him.

He sought another evaluation six months later. He was told that he did have permanent L-5 nerve root damage. Despite this, his symptoms and total incapacity were considered to be excessive in relation to his physical disability. He was transferred to the psychiatric ward.

His interviews disclosed a most difficult childhood. When a child he had been sent to a military school in Austria. He was forced to do military duty; this culminated in his spending 14 months in a prison camp, in which he saw many people die and he himself had little to eat. On being released at the age of 14, he was reunited with his family; he found them starving. His father insisted on his finishing school. After he completed school his father then demanded that he enter a seminary—which he did for six months before quitting. He emigrated to Canada at age 20 while his father was home dying of cancer. Within four years, he had received two masters' degrees. He then worked to achieve a position which made him responsible for 12,000 people. In this capacity he was required to dismiss people from their jobs and felt extremely guilty in doing so. His superior was demanding and to get his work done he often had to work for as long as 20 hours each day. Just

prior to his initial injury, he had been passed over for a promised higher position.

His symptoms were his way of expressing his anger and disappointment over his not being recognized for his work and accomplishments. They rekindled a mixture of feelings he had had toward his father, whose demands on him were excessive but for whom he cared and whom he wanted to please. Further added to this was the anger at his physician (an authority figure) who had operated on him and left him with a foot drop. Moreover his work resulted in his firing many people which rekindled the guilt acquired in prison camp (being allowed to live while others died and his family starved).

While in the hospital he made some progress but each time a test was done, his psychologic condition would regress to the extent of his denying any feelings about what had happened to him and all his symptoms would recur. And when the organic tests had been completed, he returned to a condition characterized by the emotional conflicts that had troubled him. His progress was difficult; repressed hostility, disappointment, and guilt emerged. But after two months of intensive therapy he became able to alter his ways of expressing his feelings enough that he was able to return home and to his job.

Discussion

Although the nature of our practice is such that we see many patients with psychosomatic disorders, our role—as it should be for all physicians—is to examine the whole patient as well as to exclude the possibility of organic disease. Then it is necessary to tell patients with or without organic disease that they cannot benefit from further physical treatment.

It is difficult to tell a patient that he has more pain than a physical examination can justify and that further physical treatment is not indicated. Similarly, we are aware that physical treatment of psychogenic pain can give a patient complete relief when the patient's underlying conflict is resolved and he no longer needs his symptom.

The difficulty in confronting somatizing patients lies in the physician's desire to help the patient by treating his pain, and the patient's need to keep the pain which he communicates to the doctor. Furthermore, patients are now more sophisticated and their psychosomatic symptoms more subtle, which makes the physician worry about the possibility of an occult lesion.

As our cases illustrate, when pain was treated physically it remained unaltered or became worse, or a different symptom occurred. The use of narcotic analgesics conveys the message signifying that pain must be of an organic nature. Further,

these analgesics are often used by the patient as an escape into a dream world. When given by injection the pain often fulfills the patient's masochistic need. All the patients clung to their symptoms rather than face their emotional problems. In Case 3, the patient never got to her conflicts as she heard only that she was to have surgery in the future and was sure that this would solve her pain problem. In Case 4, the patient developed numerous symptoms, would grasp onto whichever one was being investigated, and at those times would deny any conflicts.

Even if a patient has had physical symptoms of psychogenic origin for many years, he may still benefit from psychiatric treatment. But, psychiatric treatment cannot be carried out until a physician closes all avenues of physical treatment, thus forcing a patient to face the underlying conflicts.

One approach to such patients would be to tell them that they do have pain and that it is understood that the pain is real. They can be told that emotions can cause pain or intensify the pain of organic lesions and that it would be best to *try* to explore the possibility of their emotions playing a role in the origin of their pain. This approach is face-saving to patients and allows them to keep their symptoms until their conflicts can be unraveled and new ways can be developed, through psychotherapy, to help them deal with their emotions in a more constructive manner.

Psychosomatic disorders are difficult to treat. A major reason for this is lack of communication between the referring doctor and the psychiatrist. The patient often interprets this lack of communication as a lack of agreement in the diagnosis and this fulfills the patient's basic need to deny emotional conflicts and keep his symptoms. Many psychiatrists have little experience in this area and often choose to wait until all physical treatments have been exhausted. This often leads to an unfortunate situation for the patient. Our experience suggests that it is imperative that psychiatrists and their medical and surgical colleagues work together for the best approach to the patient with a psychosomatic disorder. The treatment must seem to the patient to be the result of a medical team working with him for his good. Then the patient can join the therapeutic team in his treatment and have a chance for improvement.

References 1-6 will be found on page 681.

Post Nephrectomy Arteriovenous Fistula

WILLIAM DeWOLF, M.D.*

POST SURGICAL ARTERIOVENOUS fistulas are being reported with increasing frequency. The first, described by Hunter in 1762¹ involved the brachial vessels following blood letting. Since that time there have been many reports of fistulae, resulting from many types of surgical procedures.²⁻⁸ However an arteriovenous fistula of the renal artery and vein following nephrectomy is an uncommon complication. The English literature lists 21 cases.[†] We describe herein a patient of unusual interest who developed bacteremia from an infected post nephrectomy arteriovenous fistula.

Case Report

A forty-two year old white man was admitted from another hospital with chills, fever of 104°F and positive blood cultures for staphylococcus, coagulase positive. In 1951 he had undergone a left nephrectomy for hydronephrosis due to ureteropelvic junction obstruction. The operative report indicated that the procedure was performed without difficulty and the vessels were tied individually. He had a blood pressure of 125/60 and a continuous bruit over the left flank. Blood chemistries were normal. A chest Xray revealed an enlarged heart and infiltrates suggestive of septic emboli. A diagnosis of post nephrectomy arteriovenous fistula with bacterial endarteritis was made. The patient was treated with intravenous sodium nafcillin for two weeks (6 grams per day) and his fever receded quickly. A midstream aortogram was performed which demonstrated a large left renal artery-renal vein fistula with immediate filling of the inferior vena cava (Figure). Cardiac catheterization was then performed and revealed a cardiac output of 10.3 liters per minute (about twice normal). The arteriovenous fistula was excised. The fistula measured 2-3 mm in diameter and carried a blood flow of 1200 ml per minute, about 11 percent of the patient's cardiac output. The postoperative course was uneventful. He is well, six months after surgery.

Discussion

The 21 reported post nephrectomy arteriovenous fistulas have been diagnosed as early as

five months and as late as 35 years after nephrectomy. Indications for nephrectomy included tuberculosis, carcinoma, stones and hydronephrosis. A bruit over the involved flank is characteristic. In addition, they may have findings suggestive of a high cardiac output state including the widened pulse pressure, cardiomegaly, and even congestive heart failure. The technique of operative nephrectomy was mentioned in only nine of the 21 reports. In six the renal pedicle was ligated en masse. The remaining three had postoperative wound complications including hemorrhage and abscess formation.

In addition to the arteriovenous fistula, this patient had bacterial endarteritis, an unusual but well recognized sequel of arteriovenous fistulas.⁹ This is not surprising because bacterial endarteritis can form on any portion of the vascular tree where turbulence produces endothelial trauma.¹⁰ The clinical signs of endarteritis are similar to



Figure—Aortogram demonstrating left renal artery-renal vein fistula with rapid filling of inferior vena cava.

*Chief Resident, Division of Urology, University of Minnesota Hospitals, Minneapolis, Minnesota.

†Available upon request.

endocarditis except that peripheral embolic phenomena, such as splinter hemorrhages, are absent. The infecting organism is usually streptococcus viridians although in the present case staphylococcus, coagulase positive, was found. In most cases the infection can be controlled or eliminated with intensive antibiotic therapy after which the fistula should be excised.

Summary

The literature suggests that post nephrectomy arteriovenous fistulas result from either mass ligation of the renal pedicle or from postoperative

wound complications such as hemorrhage or abscess. A bruit over the involved flank is characteristic and signs of high cardiac output including congestive heart failure may be present. These patients may also have bacterial endarteritis at the site of the A-V fistula. Their treatment consists of intensive antibiotic therapy followed by excision of the arteriovenous fistula. This is the first documented report in the English literature of a post nephrectomy arteriovenous fistula which occurred without associated mass ligation of the renal pedicle or postoperative wound complications.

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Cover Photo "Country Doctor"

Dr. John Bartness, a radiologist now practicing in Phoenix, Arizona, told the editors he had always admired the old time country doctor. "He seemed to be an institution all in himself and required a great deal of stamina." This admiration of the family doctor started when he was a child and was the reason that he painted the "Country Doctor." Dr. Bartness has been painting since 1961, has never had a lesson and is self taught.

The old time buggy was purchased from a farmer who lived near Minnesota Lake for fifty dollars. The horse was given to him by a patient who had carcinoma of the breast who told him never to sell or give the horse away. Unfortunately the horse had the heaves (emphysema) quite badly and had to be put away. He had a lot of dedication and heart and would take the doctor to the hospital in Albert Lea whenever he was called.

While practicing medicine in Albert Lea, Dr. Bartness's biggest hobby was Judo and he received a black belt in Judo after a number of years. He taught Judo in Albert Lea for 14 years, trained over 2000 students in Albert Lea and vicinity. In March of 1972, his girls Judo team performed at the State High School Basketball Tournament at Williams Arena.

In art he was a member of the Albert Lea Art Center and one of the founders of the Annual Outdoor Art Festival.

In medicine he was chief of radiology at Naeve Hospital in Albert Lea for 17 years and founded the Naeve Hospital School of X-Ray Technology in 1956.

Chronic Granulocytic Leukemia in Children

HERBERT A. COOPER, M.D.* and MURRAY N. SILVERSTEIN, M.D.*

CHRONIC MYELOPROLIFERATIVE diseases rarely occur in childhood.¹ A 20-year retrospective review at our institution revealed that nine children had chronic granulocytic leukemia and one child had polycythemia rubra vera. We found no child with agnogenic myeloid metaplasia or hemorrhagic thrombocythemia. The purpose of this communication is to review our experience with chronic granulocytic leukemia in childhood in relation to its clinical course, hematologic findings, and response to therapy.

Our Series

The records of all patients 12 years old or younger who had myeloproliferative syndrome or chronic granulocytic leukemia were reviewed. The study, covering the period from 1950 to 1970, revealed that nine children had chronic granulocytic leukemia. A diagnosis of chronic granulocytic leukemia was acceptable if the following criteria were met: (1) splenomegaly, (2) total leukocyte count of 100,000/cu mm or greater associated with myeloid immaturity, (3) a bone-

marrow aspirate that revealed striking granulocytic hyperplasia with a bulge of cells at the myelocyte level, (4) the presence of the Philadelphia (Ph') chromosome, if the study was done, and (5) the absence of any condition known to produce a continuing granulocytic leukemoid reaction, for example, infections or stress.

Findings

Table 1 gives, for each patient, the age, sex, initial hemoglobin level, leukocyte and differential counts, platelet count, presenting symptoms, and physical findings at the time of diagnosis. Only two patients (Cases 6 and 8) had chromosome analysis, and the Ph' chromosome was positive in both. In all patients, marrow aspirations and sections were compatible with a diagnosis of chronic granulocytic leukemia.

Table 2 describes the duration of life from diagnosis till death and the modes of therapy employed.

Comment

Various studies have reported that chronic

*Mayo Clinic and Mayo Foundation, Rochester, Minnesota.

TABLE 1
Data on Nine Children With Chronic Granulocytic Leukemia

	Case 1*	Case 2*	Case 3*	Case 4†	Case 5†	Case 6†	Case 7†	Case 8†	Case 9†
Age at diagnosis, yr.	1-1/4	3	4	4-5/6	7-1/3	9-5/12	9-5/12	11	12
Sex	M	M	M	F	F	M	M	F	M
Presenting symptoms	Bloody diarrhea	Easy bruising	Enlarging abdomen	Weakness	Bruising, weakness	Weakness	Bruising	Weakness	Fever
Hb, gm	8.6	9.8	10.2	7.0	6.5	6.8	9.0	6.4	10.3
Leukocytes/cu mm	169,000	95,000	158,000	540,000	606,000	393,000	401,000	307,000	233,000
Neutrophils, %	38.5	38.0	48.5	36.5	38.0	32.5	36.0	47.0	54.5
Lymphocytes, %	12.5	8.0	3.0	3.0	—	0.5	1.5	9.0	6.0
Monocytes, %	15.0	1.0	5.0	1.0	0.5	—	3.0	3.0	15.0
Eosinophils, %	12.5	—	4.0	3.5	8.5	13.5	2.0	1.0	2.0
Basophils, %	4.5	3.0	3.5	3.0	6.5	12.5	3.5	2.0	2.5
Metamyelocytes, %	2.5	18.0	11.5	12.5	5.5	8.5	4.5	13.0	5.0
Myelocytes, %	8.5	23.0	16.5	24.0	28.0	20.0	39.0	16.0	14.0
Progranulocytes, %	2.0	3.0	6.5	15.0	10.5	4.5	8.5	7.0	—
Blasts, %	4.0	6.0	1.5	1.5	3.0	8.0	2.0	2.0	1.0
Platelets/cu mm	101,000	68,000	173,000	181,000	599,000	778,000	526,000	242,000	351,000
Splenomegaly‡	6 cm	6 cm	10 cm	7 cm	10 cm	9 cm	7 cm	10 cm	5 cm
Liver enlargement‡	5 cm	None	None	1 cm	None	None	2 cm	None	None
Node palpable	++	+	+	+	++	+	+	+	None

*Juvenile form of disease.

†Adult form of disease.

‡Palpable below costal margin.

TABLE 2
Survival and Treatment of Nine Children With
Chronic Granulocytic Leukemia

Case	Form	Survival mo	Treatment
1	Juvenile	8	$R_0R_x^*$, 3 times, 6-mercaptopurine
2	Juvenile	8	$R_0R_x^*$, 3 times, busulfan
3	Juvenile	9	$R_0R_x^*$, 1 time
4	Adult	3	$R_0R_x^*$, total body irradiation
5	Adult	33	$R_0R_x^*$, spleen, total 2,285 R
6	Adult	10	$R_0R_x^*$, spleen, total 2,200 R
7	Adult	14	$R_0R_x^*$, spleen, total 2,400 R
8	Adult	71	$R_0R_x^*$, 9 times, spleen
9	Adult	23	$R_0R_x^*$, 4 times, spleen

*Total radiation dose unknown

granulocytic leukemia accounts for approximately 2.5% of all forms of leukemia in childhood.²⁻⁵ At our institution, approximately 400 patients with other forms of childhood leukemia were seen during the 20-year period study, making an incidence of chronic granulocytic leukemia about 2.5% of all childhood leukemias. Cooke⁴ suggested that the clinical course of chronic granulocytic leukemia in childhood might take two forms: juvenile and adult. This concept was reinforced more recently by Reisman and Trujillo⁶ and Hardisty et al.⁷ Data from our series further supports this conclusion: three of our patients (Cases 1, 2 and 3) had features of the juvenile disease and six (Cases 4, 5, 6, 7, 8 and 9) had the adult form. We emphasize that the juvenile disease occurs much more frequently in the very young child and that the adult form of the disease tends to occur at a later age (five years old or older). In addition to earlier age at onset, patients with juvenile chronic granulocytic leukemia tend to have lower leukocyte counts (less than 200,000/cu mm), lower platelet counts (less than 150,000/cu mm), in agreement with the findings of others.^{6,7} Children in our series with juvenile chronic granulocytic leukemia had a more virulent clinical course, poorer response to therapy, and a shortened survival time. Neither the sex of the patient nor the degree of anemia when the disease is diagnosed seems to aid in differentiating the juvenile form from the adult form.

Hardisty et al.⁷ reported four patients with the juvenile form and four patients with the adult type and suggested that splenic enlargement was greater in the adult type and lymph node enlargement and rash were more prominent in the juvenile form. In our series, neither the degree of lymph node enlargement nor the presence of splenomegaly was helpful in differentiating the two types. Rash

was not seen in any of our patients with the juvenile form.

Hardisty et al.⁷ noted a higher proportion of blasts, monocytes, and lymphocytes in their patients with the juvenile form. Our series does not reflect this. Bernard and associates⁸ have classified the juvenile form as seen in children as myelomonocytic leukemia. Data on three juvenile patients in our series do not support such a hematologic diagnosis on the basis of morphologic findings.

Reisman and Trujillo⁶ and Hardisty et al.⁷ have suggested that the juvenile and adult forms in childhood may be further differentiated on the basis of the Ph' chromosome. Interestingly, one of our patients (Case 6), who had a Ph' chromosome, survived only 10 months after diagnosis despite having clinical features and hematologic features suggesting the adult form of the disease.

Another finding suggested as helpful in differentiating the juvenile form from the adult form in children has been the presence of increased levels of hemoglobin F in the juvenile form. Initially noted by Beaven et al.³ in two children, Hardisty et al.⁷ also noticed increased hemoglobin F levels in patients with the juvenile type. The latter authors further observed normal hemoglobin F levels in three patients with the adult type. Bloom et al.⁹ reported an eight-month-old infant with the adult type who had the Ph' chromosome. This patient also had persistently normal levels of hemoglobin F. Unfortunately, none of our patients had hemoglobin F levels measured.

Hardisty et al.⁷ summarized the survival of 29 patients with the juvenile type and 58 patients with the adult type. Mean survivals were nine months for the former and 33 months for the latter. Treatment of these 87 patients varied. Interestingly, all nine patients in our series primarily received radiation therapy. In our series, the

mean survival of the three patients with juvenile form was 8.3 months as compared to that of 30 months for the six patients with the adult type. These data suggest that radiation therapy may not be the modality of choice for either form of the disease. Perhaps a more aggressive combined chemotherapeutic approach with immunotherapy is best in the juvenile form and a combined chemotherapeutic approach is warranted in the adult type. In our series, conceivably, the patients with the Ph' chromosome who had other features of the adult form did not live as long because radiation therapy was used.

Our experience with this disease agrees with the observations of others that two forms exist. The juvenile form seems to be characterized by a younger age at onset, lower total leukocyte count, lower total platelet count, and shortened survival. The adult form in children seems to occur after the age of five years and appears to be associated with a higher total leukocyte count in the absence of thrombopenia. The presence of the Ph' chromosome may well portend longer survival. Further exploration of the levels of hemoglobin F is necessary to determine if a relationship of this parameter to the adult form exists exclusively.

To explain the existence of two forms of childhood chronic granulocytic leukemia, Hardisty et al.⁷ have proposed that the juvenile form may be a congenital disease and that the presence of

increased levels of hemoglobin F may reflect a prolongation of fetal erythropoiesis. However, except for the younger age of onset of this form in children, no direct evidence supports this concept. In comparing our data with the observations of others, the single most important determinate as to the form that the disease will take in childhood depends on the age at onset when the diagnosis is made. One cannot help but speculate that the state of maturity of the bone marrow and the internal hormonal milieu at the time of the leukemic insult are of prime importance in determining the clinical course.

Summary

In a 20-year period at the Mayo Clinic, nine children with chronic granulocytic leukemia were seen. Three patients had the juvenile form, which is characterized, at diagnosis, by lower total leukocyte and platelet counts, a younger age, a shortened survival (mean 8.3 mo.), and a poor response to therapy. Six patients had the adult form, which is characterized by a later age at onset, higher total leukocyte and platelet counts, longer survival (mean 30 mo.), and a better response to therapy. Two patients had positive Philadelphia chromosome preparations. Data suggest that the age of the patient at diagnosis is important in determining the disease course.

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George Drexler, M.D.

Dr. George Drexler received a silver medallion from Dr. John Anderson, a gift from the staff of the Blue Earth Medical Center. They honored him for his 26 years of service to Blue Earth. The medallion signifies his 25 year membership in the American Academy of Family Practice.

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Contraindications: Evidence or history of blood dyscrasia, active organic disease of the CNS, the first trimester of pregnancy and a history of hypersensitivity to metronidazole.

Warnings: Use with discretion during the second and third trimesters of pregnancy and restrict to those pregnant patients not cured by topical measures. Flagyl (metronidazole) is secreted in the breast milk of nursing mothers. It is not known whether this can be injurious to the newborn.

Precautions: Mild leukopenia has been reported during Flagyl use; total and differen-

tial leukocyte counts are recommended before and after treatment with the drug, especially if a second course is necessary. Avoid alcoholic beverages during Flagyl therapy because abdominal cramps, vomiting and flushing may occur. Discontinue Flagyl promptly if abnormal neurologic signs occur. Exacerbation of moniliasis may occur. In amebic liver abscess, aspirate pus during metronidazole therapy.

Adverse Reactions: Nausea, headache, anorexia, vomiting, diarrhea, epigastric distress, abdominal cramping, constipation, a metallic, sharp and unpleasant taste, furry or sore tongue, glossitis and stomatitis possibly associated with a sudden overgrowth of *Monilia*, exacerbation of vaginal moniliasis, an occasional reversible moderate leukopenia, dizziness, vertigo, incoordination and ataxia, numbness or paresthesia of an extremity, fleeting joint pains, confusion, irritability, depression, insomnia, mild erythematous eruptions, "weakness," urticaria, flushing, dryness of the

mouth, vagina or vulva, pruritus, cystitis, a sense of pelvic pressure, dyspareunia, fever, polyuria, incontinence, decreased libido, nasal congestion, proctitis, pyuria, darkened urine have occurred in patients receiving the drug. Patients receiving Flagyl may experience abdominal distress, vomiting or headache if alcoholic beverages are consumed. The taste of alcoholic beverages may also be modified. Flattening of the T wave may be seen in ECG tracings.

Dosage and Administration: For trichomoniasis. *In the female:* One 250-mg. tablet orally three times daily for ten days. The course may be repeated if required in especially stubborn cases; in such patients an interval of six weeks between courses and total differential leukocyte counts before, during and after treatment are recommended. Vaginal inserts of 500 mg. are available for use, especially in stubborn cases. *When the vaginal inserts are used,* one 500-mg. insert is placed



vaginal vault each day for ten days and dosage is reduced to two 250-mg. tablets during the ten-day course of treatment. Do not use the vaginal inserts as the sole therapy. *In the male:* Prescribe Flagyl when trichomonads are demonstrated in the genital tract, one 250-mg. tablet two times daily for ten days. Flagyl should be taken by partners over the same ten-day period as prescribed for the male in conjunction with the treatment of his female partner.

Amebiasis. *Adults:* For acute intestinal amebiasis, 750 mg. orally three times daily for 10 days. For amebic liver abscess, 500 mg. orally three times daily for 5 to 10 days. *Children:* 35 to 50 mg./kg. of body weight in 24 hours, divided into three doses, for ten days.

Forms: Oral tablets 250 mg.
Vaginal inserts 500 mg.

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Editorials

Rural General Practitioners

RURAL GENERAL practitioners (RGP) are recruited from medical students and young doctors with exposure to rural living. And the greater the exposure, the greater the likelihood of the medical graduate adopting the life of the RGP. This is the conclusion that is drawn from the comparative study of the RGPs vs. UGPs (urban general practitioners).

Carter et al.* found there is less chance of success in a small town setting of the city-bred, urban trained physician transplanted to the market town. The best country doctor material is the country boy temporarily transplanted to the city for his education, but whose roots are not in the city but in the country surroundings of his formative years.

The usual criteria for entrance to medical school used by admissions committees are: (1)

Grade-point averages and (2) medical aptitude as determined by the medical aptitude test. The effect of adding additional criteria—race, sex, place of birth, the size of the town the applicant grew up in, any other criterion whatsoever—necessarily must vitiate the criteria of scholastic excellence and medical aptitude.

But people will continue to demand primary medical service to be given in their area, and no amount of consultative service available elsewhere will compensate for absence of primary care at the source.

The need for doctors in the rural areas in Minnesota must be met.

Dr. Carter, who is the Dean of the Duluth Medical School, suggests one way to get more RGPs—select more rural people for medical training.

Reuben Berman, M.D.
Editor

*See page 713.

Medical Writing and Cover Photograph Awards: 1972

EACH YEAR THE Board of Editors selects the best original article and the best cover for the year before.

The winners for 1972 are:

Best Cover: "November Song," photograph by John P. Wendland, M.D., Minneapolis ophthalmologist.

Best Article: "Idiopathic Scoliosis—Current Concepts in the Treatment," by Robert B. Winter, M.D. and John H. Moe, M.D.

Analyzing the Board

Each year I try to analyze why the Board selected the winners it did. Psychoanalyzing one person is hard enough. Psychoanalyzing a Board of Editors, each of whom has his own piece of mind, is a job of a completely different magnitude. It would be tough for a psychiatrist to analyze such a group of spirits. Nevertheless I shall have a go at second guessing the Board.

November Song

First, "November Song." Frankly, I think the Board picked this cover because the photograph displays the proper perspective, focus, clarity and composition. Besides, it's a good picture. Not only that, it's a good picture of a field of Minnesota corn shocks taken on a beautiful autumn day.

For your information, there may have been a sympathy vote among the Board. You see, when the picture appeared, the Editors and the photographer who described it made a shocking mistake. Quoting Doctor Wendland, the Editors wrote: "He recalls the area as being around Red Wing and at the time was impressed with this particular field of wheat as this method of harvesting wheat has been disappearing from the farm scene." The wheat stacks, as many readers promptly informed us, were really corn shocks. Anyway, we apologize. Next time we'll try to have a better sense of humor.

Idiopathic Scoliosis

Now, the article . . . Here the Board was nearly

unanimous. And for good reasons. Doctor Winter and Moe, who are Medical Director and Chief of Staff at Gillette Children's Hospital, St. Paul, know their subject matter and write about it well. You can tell that from the clarity and tone of the prose.

For example, here's the opening paragraph:

"Scoliosis, once considered the scourge of orthopedics, has entered a new phase. In the past treatment of this condition was so poor that one could only stand by and watch the curve get worse. Finally, when it got bad enough, a difficult fusion operation was done as a last resort. Such pessimism no longer has a place in the treatment of this condition, and the entire concepts of treatment have changed within the past ten years."

And a paragraph on treatment:

"There are three ways to treat these curvature. The *first* is to do nothing except to observe the child periodically, including the taking of X-rays to see whether a curve is present, or if present whether it is progressive. This type of 'observational treatment' is rarely justifiable. *As noted previously, physical therapy and exercises do not have not, and never will correct an already present curvature of the spine.* Exercises are important when properly combined with a Milwaukee Brace or fusion program."

And a comment on the Milwaukee brace:

"Therefore, when applied *early enough*, worn *long enough*, and removed *slowly enough*, the curvature will be completely halted in its progression and never reach a significant degree of curvature."

This is obviously authoritative stuff. The proverbs ring true, and the authors buttressed their words with excellent X-rays and photographs.

Again the Board has made excellent choice for the best cover and article.

Richard L. Reece, M.D.
Minneapolis, Minnesota

Fibercolonoscopy

IN THIS ARTICLE Latts, Borken, and Kaplan* have shown the value of Fiberoptic Colonoscope as a diagnostic tool, although the scope used was only 80 cm in length. The development and progress of this instrument have been rapid. Now, the longer scopes of 100 cm and 185 cm, with the deflection to four directions, are available, which can be passed to the left transverse colon and cecum, respectively. The most recent progress of this instrument is its therapeutic application. Wolff and Shinya¹ have proved that polypectomy via Fiberoptic Colonoscope, when

properly done, is a safe procedure. The procedure is a potential hazard. Possibility of bleeding and perforation should always be kept in mind. It is the endoscopist's judgment to carefully select the cases. Up to the present time polypectomy through the scope should be performed only in pedunculated polyps or in the small, benign-looking sessile polyps. A certain skill must be acquired to use the instrument efficiently and safely.

Santbat Nivatvongs, M.D.
University of Minnesota

*See page 665.

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1. Wolff William I and Shinya Hiromi: Polypectomy via the fiberoptic colonoscope. Removal of neoplasm beyond reach of the sigmoidoscope. *New Engl J Med* 288:329, 1973.

Do You Drink A Quart of Whiskey A Day?

WEINBERG'S ARTICLE "Why Do Alcoholics Deny the Problem?"* illustrates the type of patient whose alcoholic history is likely to be totally suppressed and undiscovered by the physician.

I have found the question "Do You Drink A Quart of Whiskey A Day?" helpful in screening the alcoholic patient. The answer is invariably "no." The non-alcoholic, however, reacts by some indication that the query is ridiculous. He may laugh or appear shocked by the very question. The alcoholic turns it over in his mind and his negative answer gives the impression that he accepts the question as legitimate and ordinary to be answered with a flat "no."

The alcoholic as an evil man, an immoral per-

son, mentally inferior, possessed by the demon rum to be pitied or shunned by polite society, is a stereotype accepted by many including, unfortunately, physicians. If we are to make any progress in the treatment of alcoholism we must adopt a professional attitude toward the sick alcoholic confronting us.

Doctors are accustomed to suppressing emotions in themselves in their handling of disagreeable patients. Perhaps the failure to accomplish any significant improvement in the alcoholic patient stems in part from our own suppressed but never entirely hidden attitude of disgust for the habit rather than sympathy for the diseased individual.

Reuben Berman, M.D.
Editor

Winston Miller, M.D.

The Northlands Regional Medical Program should not be allowed to close its books without some recognition from the doctors of the state of the important contributions to post graduate medical training made by Dr. Winston R. Miller, its program director.

A special mention should certainly be made of the emphasis placed here on educational aids to practice instead of the establishment of the large centers of treatment contemplated at the outset by Washington planners. It is certain that much of the work done under Dr. Miller's direction will persist as a permanent aid to the practice of medicine in Minnesota.

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Budd-Chiari Syndrome

An Etiologic and Therapeutic Enigma

THE CAUSE OF THE Budd-Chiari syndrome is unknown in 70% of the cases. Polycythemia vera is associated in 30% of cases.¹ A small percentage of cases have other associated conditions, which have been enumerated in the discussion of the case report by Retzlaff and Mongé in the January issue* of MINNESOTA MEDICINE.² Although the authors of this current report assert that their patient had polycythemia rubra vera, data (that is, blood volume studies, status of megakaryocytes in bone marrow, platelet counts, leukocyte alkaline phosphatase, etc.) are lacking to confirm the diagnosis. A secondary cause for polycythemia is suggested inasmuch as the hemoglobin level decreased after rehydration and removal of the pelvic leiomyoma, a reported cause of erythrocytosis.³ Apparently, hypernephroma, oral contraceptives, membranous obstruction of the inferior vena cava, and other causes of hepatic vein occlusion can be excluded. This case probably should be one of the Budd-Chiari syndrome of unknown cause.

Although the overall prognosis in hepatic vein occlusion is poor, patients may survive for several years, and some have recovered completely after cessation of oral contraceptives when these agents have been implicated as an etiologic factor⁴ and after vigorous treatment of polycythemia vera.⁵ The treatment of Budd-Chiari syndrome is largely symptomatic. In the acute stages, patients are heparinized and their ascites treated by restriction of salt and fluid and by diuretics. If hepatic coma supervenes, it should be treated in the usual fashion (protein restriction, enemas, and neomycin). In late stages of the disease, side-to-side portal-caval anastomosis should be considered and has been successful,⁶ if the vena cava is patent. In caval obstruction, decompression has been attempted by a Y-shaped Dacron graft connecting the right atrium, superior mesenteric vein, and right internal iliac artery;⁷ a Teflon graft between the proximal end of the splenic vein and transected distal end of the left pulmonary artery to the left lower lobe;⁸ a Teflon graft between the proximal splenic vein and the right atrium;⁸ or transposition of the spleen into the left thoracic cavity.⁹ The infrequency of these operations and lack of controlled studies make it impossible to assess their

overall value.

Although the role of surgical procedures in the treatment of this syndrome remains controversial, if the site of obstruction is delineated and no underlying otherwise treatable conditions are present, definitive surgery may be successful. An investigation should be made of young to middle-aged persons with severe ascites who do not have any clinical or histologic features of cirrhosis so that correctable lesions might be identified. Hepatic venography in conjunction with pressure measurements is most important. Constrictive pericarditis and heart failure must be excluded by clinical testing, and, in doubtful cases, by right atrial pressure studies to eliminate these possible causes of hepatic congestion.

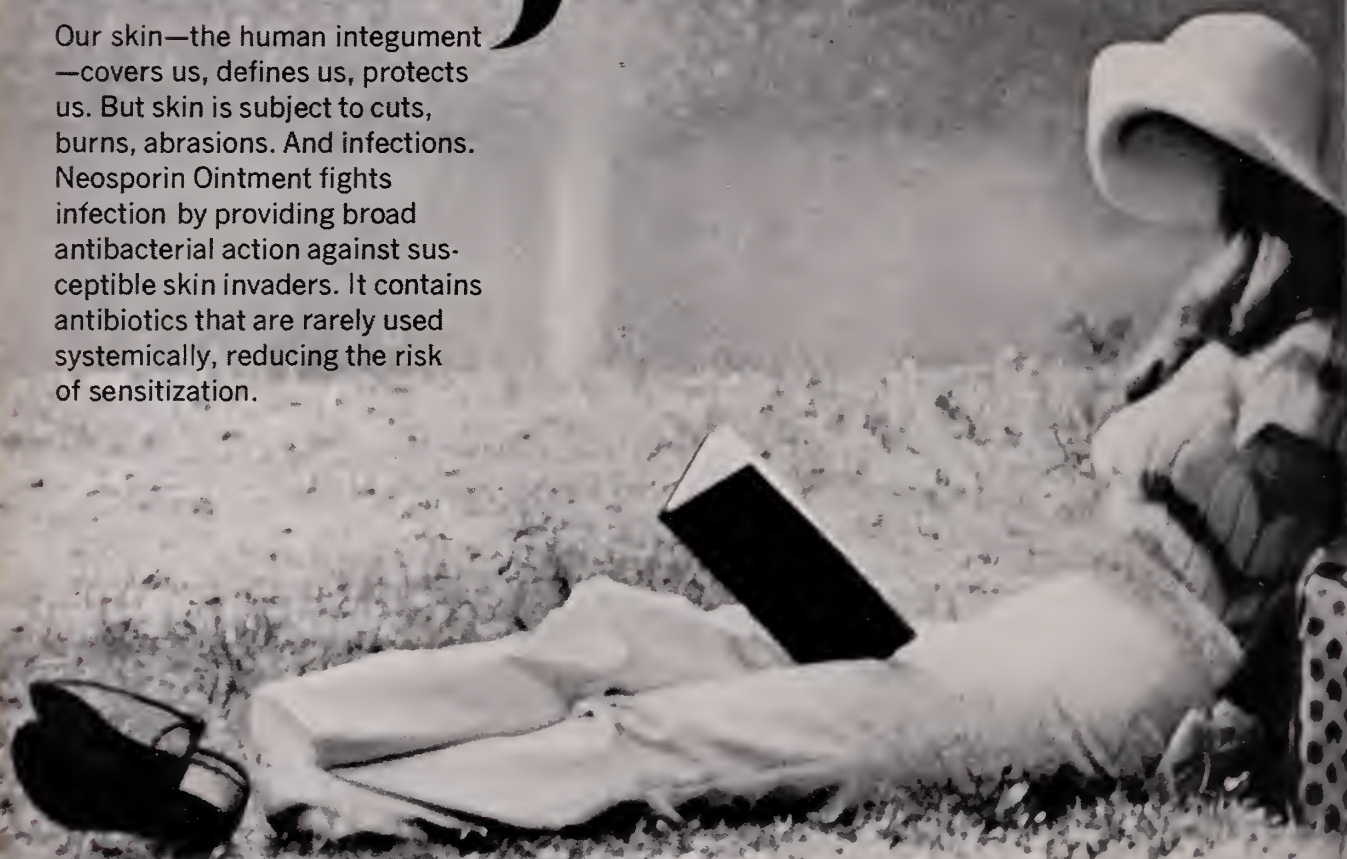
Recently, membranous or fibrous diaphragms occluding the inferior vena cava above the entrance of the right hepatic vein have been identified and treated by transcatheter membranotomy.^{5,10-13} Surgical procedures also have been attempted to relieve inferior vena caval obstruction; these include anastomosis of the azygous vein to the medial side of the inferior vena cava below the obstruction¹² and Dacron grafts between the inferior vena cava and the right atrium.^{12,14} More recently, decompression of the hepatic vein and inferior vena cava under direct vision by means of total circulatory arrest, profound hypothermia, and a pump oxygenator has been successful.¹⁵ Unfortunately, many patients will not be relieved of venous obstruction by surgical treatment because the thrombosis is usually extensive. Even if inferior vena caval obstruction is relieved, patients with remaining occlusion of all hepatic veins have a poor prognosis.¹³ Patients who undergo exploratory operations without a definitive procedure have a high mortality rate.⁵ Exploration rarely contributes information that cannot be obtained otherwise. Surgery in the acute stages of this syndrome should be avoided unless an operable lesion can be anticipated.

Progress has been made in uncovering some causes of Budd-Chiari syndrome and new therapeutic surgical procedures have been attempted. Currently, the vast majority of patients with this infrequent syndrome will die of their disease. With further study the pathophysiology of this process

*Retzlaff K and Mongé JJ: Polycythemia vera with acute Budd-Chiari syndrome. *Minnesota Med* 56:1:60, 1973.

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ould be better understood and better management will be possible.

Eugene P. DiMagno, M.D.
Rochester, Minnesota

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Renal Failure Caused by Cholesterol Emboli

BLOOM, WINTHROP AND SAROSI* describe in the December issue of MINNESOTA MEDICINE a clinical disorder that has received inadequate attention in the medical literature—renal failure due to atheromatous emboli. The individual at greatest risk is the male over age 60 who has advanced ulcerating atheromatous disease of the aorta. Frequently hypertension, nephrosclerosis, and diabetes mellitus are associated. An aneurysm may or may not be present.

The diagnosis is made most readily when it occurs during surgical repair of an abdominal aortic aneurysm. Manipulation of the atherosclerotic vessel releases variable amounts of eroded atheromatous debris into the renal arterial tree. The main renal arteries or their primary branches are occluded by large atheroemboli. Smaller cholesterol emboli occlude the arcuate and interlobular vessels. The resulting loss of renal function usually is permanent. Theoretically renal blood flow may be increased by removing atheromatous material from the largest vessels, but simultaneous involvement of the smaller branches prevents significant improvement. Cholesterol emboli also may be released during rupture of an aneurysm prior to surgical intervention.

Whether oliguric or non-oliguric, sudden renal failure due to atheromatous embolism following aneurysmectomy is to be differentiated from the more familiar "acute tubular necrosis" resulting from ischemia. With good preoperative hydration, maintenance of adequate arterial oxygenation during anesthesia, and use of osmotic or saluretic diuretics to maintain adequate urine volume, acute tubular necrosis secondary to the repair of aortic aneurysms occurs less frequently now than was the case just a few years ago. However, renal failure due to atheromatous embolism assumes increasing significance. Differentiation between the two syndromes can be made by renal arteriography. Occlusion of even the smaller arcuate or interlobular arteries can be detected by X-ray.

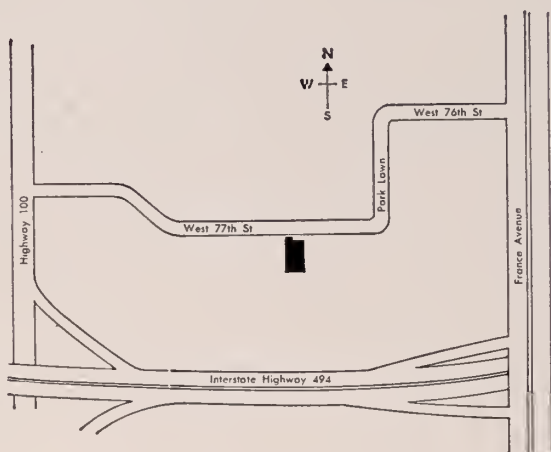
A diagnosis frequently missed is cholesterol embolism occurring spontaneously as illustrated by the case reports of Bloom, et al. Showers of cholesterol crystals from various parts of the aorta may be released over a period of time, producing multiple small infarcts in many organs. Renal involvement is only one part of the total picture. Recurrent abdominal pain results from occlusion of branches of the mesenteric or pancreatic arteries. Livedo reticularis, petechiae, painful nodules and purple toes indicate emboli to the extremities. "Small strokes" may occur if the

*Bloom MG et al: Spontaneous cholesterol embolic renal failure. *Minnesota Med* 55:1099, 1972.

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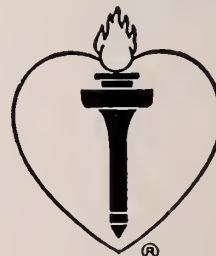
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ascending aorta is involved. Loss of renal function frequently is accompanied by an accelerated hypertension. The small renal infarcts produce a "micro-Goldblatt phenomenon"¹ with activation of the renin-angiotensin-aldosterone system. Again the diagnosis can be established by renal arteriography, or by histopathologic examination of the kidney. The presence of cholesterol crystal clefts with a surrounding giant cell foreign body reaction is diagnostic. Treatment by anticoagulation is not beneficial, but may be detrimental as Bloom and

associates observe.

The individual who loses renal function during the repair of an aortic aneurysm may be a suitable candidate for chronic hemodialysis, assuming good cardiac and cerebral function. Today many patients in their seventh and eighth decades of life are maintained quite well by long-term dialysis. Little can be done for the individual with multiple organ involvement.

Donald A. Duncan, M.D.
Minneapolis, Minnesota

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1. Castleman B, Scully RE, McNeely BU: Case records of the Massachusetts General Hospital. Weekly clinicopathological exercises. *New Engl J Med* 286:422, 1972.

Indians, Alcohol and Violent Death

THERE IS FAR more myth than factual foundation in our understanding of the American Indian. This must be as true of their health problems as it is for any other aspects of their lives. Westermeyer and Brantner* are to be commended for bringing to our attention some of the special social and health problems of the Chippewa Indians of Minnesota.

In this article they display the startling fact that one-fourth of all Indian deaths are due to accident or violence. Such incidents are, in the case of Indians, the ranking cause of death. Further, it is assumed that one of the major health problems of the Indians is their excessive use of alcohol. This is not so easily proved because the criteria for excessive use of alcohol vary within any culture and certainly across subcultures. The third striking feature with respect to their health in contrast to Caucasians, is their life span. It is substantially shorter than for whites and they are far less plagued with degenerative diseases. It may be, but it is not clearly shown in this paper, that this is due to premature demise because of accidental and violent death. The authors sought to determine, however, if such a relationship did exist.

Indicators such as a sampling of blood alcohol may be somewhat skewed by factors of race and

age, especially in association with violent death, because such samplings were more frequently drawn in young Indians dying under those circumstances. The method used by the authors on correcting for age may not be as refined as they would have liked to relate accidents as the cause of death in the overall population. Although such cross-cultural studies such as this are of interest, they cannot add substantially to the difficult problem of showing conclusively causative relationships. For example, if we were to examine the relationship between alcoholism and accidents as a cause of death in whites in the general population, I doubt if we would strike a comparison with the Indians or the blacks. By the same token, if we wish to examine the possibility of a relationship between Indian life style, alcoholism, or accidents and violence as it relates to early age death in Indians, such relationships could be examined without racial comparisons. As the authors have indicated, it might be more meaningful to look at life styles within Indian subgroups.

In any event, cross-cultural studies do call to our attention that certain of our minority citizens have many special health problems which have not come to our attention because they have been lost in the statistics for the general population.

William W. Jepson, M.D.
Minneapolis, Minnesota

*Westermeyer Joseph and Brantner John: Violent death and alcohol use among the Chippewa in Minnesota. 55:749, 1972.

OLD DOC HESS SAYS: Some people seem to proclaim that they know more about your business than you do. . . . C.O.R.

Letters to the Editor

To The Editor:

Dr. Fehr's editorial in the May issue of MINNESOTA MEDICINE¹ entitled "Infectious Complications Following Abortions" implies (1) that the advocates of free-standing abortion clinics are minimizing the complication rate because of the poor follow-up on their patients.² (2) He also deplores the "no-touch" technique and the absence of a sterile (and expensive) hospital setting in the performance of pregnancy termination.

His arguments are apparently based on the recent admission to Minneapolis General Hospital of several patients with post-abortion pelvic infection.³ These patients received primary care at several out-of-state clinics. We have no idea how many total patients are represented by these infected few appearing at Minneapolis General Hospital. In view of the fact that 1000 women a month were being forced at that time to leave Minnesota and travel across the country and back to obtain medical care, it is not at all surprising that some of these inevitable complications would eventually end up at Minneapolis General Hospital. It is unfortunate that these patients were not given primary care at home thereby possibly avoiding such complications, but we can draw no conclusions from the article of Gaziano and Kaplan³ as to the actual incidence of infection following legal abortion.

If Dr. Fehr would peruse the current literature he could find a number of answers to the questions raised by his editorial regarding such incidence (See references 4-15, inclusive).

May I quote from a recent survey of the subject: "Retained products of conception frequently require repetition of the surgical evacuation for the control of either bleeding or associated infection. The incidence of this requirement varies between 2.9 to 3.5 per 1000 patients."¹⁰

Dr. Tietze in the JPSA study⁶ revealed that the rate of postoperative infection and hemorrhage is actually lower in the freestanding clinics than in the hospitals, and also lower in the outpatient hospital group than with the in-patient hospital group. These figures are based on those patients with whom follow-up contacts were made. In defense of the follow-up procedure of our ambulatory clinic, we are able to trace up to 70% of our patients by means of telephone calls, patient's follow-up forms, physicians' follow-up cards, and contacts with referring agencies.

Dr. Fehr empirically claims that the costly sterile technique of a surgical operating room is necessary to protect "the life and health of those women who choose to be aborted."¹ But the JPSA report⁶ found that it was safer for a woman to have a vacuum aspiration procedure in a free-standing clinic than in a hospital. As far as mortalities are concerned, we have had none in over 28,000 procedures (Preterm Clinic, Washington, D.C.). Nathanson reports no mortalities in over 30,000 procedures.^{7,8}

"The minimal sterile technique used in a free-standing ambulatory abortion clinic," so deplored by Dr. Fehr, is establishing excellent records throughout the world.^{12,13} It is true that prior to the uniform legalization of abortion accurate statistics on abortion patients were extremely difficult to obtain. But, New York State with its almost three-year experience has done a magnificent job in record keeping and in documenting the safety of the various techniques and facilities for the rest of the country. Let us give their statistics the attention that they deserve.⁴

In view of the wide-spread effort to reduce the cost of medical care, it was

surprising to note Dr. Fehr's implication that all abortion patients be hospitalized. With pre-admission screening and hospital review committees many procedures will soon be assigned for outpatient treatment, regardless of insurance coverage, and this is the only way that the high costs of medical service will be curtailed. Free-standing abortion clinics are pioneering the way for the delivery of many surgical and medical services on an out-patient basis.

In 1973, the free-standing clinic serves as the main source of delivery of this highly specialized service. At the present time, the free-standing clinic can terminate first trimester pregnancies far more economically and expeditiously and with a better safety record than the usual hospital.

I am well aware of the surge of activity around the country among the members of our profession in an attempt to implement the new abortion laws. It is vitally important that these facts be presented in a straight-forward manner.

Jane E. Hodgson, M.D.
Washington, D.C.

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To The Editor:

The letter of Dr. Hodgson repeats statistics on the safety of ambulatory abortion which we have all heard many times before. The article of Kaplan and Gaziano* gives us facts which definitely cast a shadow of doubt on the validity of those statistics. Unfortunately, the statistics quoted in Dr. Hodgson's letter are those by proponents of ambulatory abortion and not the statistical analyst. An old professor of statistics once warned us that one can prove anything he wished with statistics.

The article of Kaplan and Gaziano can not be refuted; therefore, we must view with caution the statistics of safety ensued by the proponents of ambulatory abortion.

Peter E. Fehr, M.D.
Minneapolis, Minnesota

*Kaplan and Gaziano: Minnesota Med 56:4:269, 1973.

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Medical Morality and Medical Excellence

SEYMOUR HANDLER, M.D.*

IN TRADITIONAL RELIGIONS, morality involves questions of right and wrong. The less formal religions consider morality as the effect of our actions and thoughts on our fellow man. In this broader sense, and as it pertains to the practice of medicine, morality may be equated with medical excellence.

The patient depends on medical morality because the physician is the denominator of patient care. Who but the physician can the unsophisticated layman look to for guidance and protection in the complex and institutionalized maze that is medical care today. When every activity involving physician and patient serves to benefit the patient, pure medical morality exists. Unfortunately, in the past several decades, medical technology and activity have proliferated to a point where the practice of medicine is on a high level, but patient care lags behind. Somehow, in the whirlwind of activity in our offices and hospitals, we must control medical activism and be concerned solely with what is best for the patient.

How do we achieve a medical environment in which the welfare of the patient is given constant consideration. Many methods exist to improve medical care, and the succeeding suggestions are not exclusive.

A major factor in good medical care is frequent consultation. As the years roll by in a physician's practice, experience creates a sense of medical omnipotence, where diagnoses appear obvious, and where little is to be gained with another opinion. Unfortunately, what is considered "obvious" may turn out to be something else, and what is called experience is often repetition of error. True experience is an educational process in which we profit from mistakes or learn from our peers. A reasonable reliance on experience is acceptable in medical problems where the disease is self-limited or of little consequence. However, in the more serious illnesses seen in hospital situations, an additional opinion may offer new diagnostic insight and may avoid a traumatic or unnecessary procedure for the patient. An entirely new evaluation by a consultant, beginning from a zero information

base, without preconceived notions, often reveals a previously unconsidered diagnostic possibility. How difficult it is for we physicians to change direction in the evaluation of a patient problem; so easy to follow an already chosen path.

Consultation rates differ as widely as the talents of the physicians. Some good clinicians regularly seek consultation, while others infrequently seek help. Consultation need not be limited to the primary care physician. Specialists need help and patient care could not help but be benefited if specialists more frequently called in other specialists for additional opinions. In most instances, seeking consultation elevates the referring physician in the eyes of the patient, who then is firmly convinced that *his* doctor is truly concerned about his condition. Physicians who consider consultation an admission of inability or an unwarranted expense are mistaken, and the patient suffers for this error. Further, not only should consultation be more frequent, but the physician seeking help should choose the best consultant possible, the one most likely to be helpful to the patient. Too often, choice of consultant is based on convenience to the physician, habit pattern and personality factors. The consultant should be one who works well with the referring physician, because the art of medicine is involved in patient care. The physician should not fall into the habit of *always* calling the same consultant, when in a given case, more effective consultation is available.

A second place where patient care may be improved is avoidance of defensive medical procedures. Physicians who order extensive batteries of diagnostic procedures are often trying to substitute for diagnostic judgment. The diagnostic test most helpful to the patient is the test that confirms the clinician's impression. Obtaining a "complete workup" of diagnostic tests is not good medical care. Unless a diagnostic procedure entails little risk, small expense, and has at least some chance of providing information, such routine tests should be avoided. Of particular concern is extensive testing of senior citizens who are as well as could be expected for their age. The practice of perform-

*Minneapolis, Minnesota.

ing complex, tiring and expensive diagnostic tests on octogenarians without specific indication is not good service to elderly patients. Their longevity is proof that they have passed the test of years, and preventive medicine without symptoms in older patients is unwise. A similar line of reasoning pertains to procedures that are done out of concern for medicolegal litigation. Physicians should practice medicine, not law. In recent actions, "defensive medicine" has been successfully litigated against.

Another way to improve patient care is to guard against bandwagon psychology. New diagnostic and therapeutic procedures should be evaluated by competent investigators at appropriate centers, not studied on individual patients at community hospitals. The individual physician, in the complex interpersonal relationship developed with his patient, is in no position to evaluate a new procedure. Evaluation must divorce patient hope and physician optimism, and depend on "double blind" procedures in which as many variables as possible are eliminated. It is not necessary that a new surgical procedure be performed at every hospital, just because the hospital down the street is doing that operation. The procedure must justify itself,

with proof that patient care is improved.

Physicians must look upon the practice of medicine as a profession dedicated to the welfare of the patient, rather than as a convenient way to earn a good living and gain community prestige. Vital to this professional outlook is a willingness—nay, rather an intense desire—to make postgraduate education an integral part of every working day. We should not wait for our professional societies or the "government" to set minimal standards of continuing education or recertification. The informed physician is best able to evaluate the "advances" leaked to the news media by grant-seeking investigators. Real medical knowledge is available, not from the drug detail man, but in the medical literature and from regular attendance at hospital staff and specialty society meetings. "Keeping up" is hard work, requiring a regular expenditure of time, but gratifying, from the realization that the patient is better off. Continuing education may be the heart of medical excellence—knowing enough about one's field to best care for the patient.

Medical morality *is* excellence of medical care. By keeping the patient in mind at all times, and relegating the benefits to medical practice to the background, patients will be better served.

Request for Physician's Art Work

For many years the Board of Editors of MINNESOTA MEDICINE has recognized and supported photographic and other artistic talents of the members of the Minnesota State Medical Association publishing cover pictures in color of their work. Our series of color covers have received much favorable comment and many journals have followed us in the use of color art in this manner.

We solicit color photographs including pictures of all art forms created by members of the Association. These must be technically excellent to show off the subject to its best advantage.

Although in the past we have printed cover pictures depicting many distant parts of the world, photographs of life in Minnesota will be given preference. Pictures will be returned if identified with the name and address of the physician. Please submit your picture as prospective cover subjects to the Editor of MINNESOTA MEDICINE, 375 Jackson St., St. Paul, Minnesota 55101.

Farrell Stiegler, M.D.
Cover Editor

Endotracheal Intubation of the Newborn

MARTHA BURKE-STRICKLAND, M.D.*

ESTABLISHMENT AND maintenance of effective ventilation in the newborn often requires endotracheal intubation. Attending personnel should be able to carry out the procedure without delay when needed if neurological potential of the infant is to be preserved.

Indications

Resuscitation of the depressed baby at delivery.

Resuscitation of an infant with cardio-respiratory arrest.

Establishment of a clear airway in aspiration syndrome.

Assistance of respiration for the tiring premature.

Assistance of the infant with respiratory distress whose inability to maintain an adequate blood pH and blood gases cannot be corrected with mask assistance.

Complications

Complications which may be attributed to the procedure itself include laryngeal bruising and edema, laceration of vocal cords, pneumomediastinum, pneumothorax, intubation of the esophagus instead of the trachea, injury to the spinal cord.

Possible complications that may occur secondary to conditions of use of the endotracheal (ET) tube include ulceration, hemorrhage, necrosis scarring stenosis, obstruction, atelectasis and infection.

Precautions During the Procedure:

1. Protect the infant from chill stress.
2. Keep the head supported. Do not allow it to drop over the edge or the rim of the work surface.
3. Work quickly but calmly.

The Endotracheal Tube

A 3 mm uniform internal diameter, soft, flexible, nontoxic, bevel-tip plastic tube may be used to intubate most newborns. A 2.5 mm tube may be needed for infants weighing less than 1,000 grams. To facilitate passage of as large a suction catheter as possible, the male connector of the

standard 15 mm adapter should have an internal diameter as large as the internal diameter of the plastic ET tube. Length of the tube should be equal to one-fifth the crown-heel length of the infant. Adjustments in length should not be made by cutting the beveled end. The residual sharp edge increases the risk of trauma to the larynx and trachea. Warming the tube and adapter in hot water facilitates ET tube removal from and reapplication to the adapter.

The orange Cole type tube with a narrowed diameter at the tracheal end is not used in our unit. The flange shape prevents the ET tube from advancing too far into the trachea, however, this advantage of the Cole tube is outweighed by the increased pressure necrosis the flange may cause in the vocal cords; the greater difficulty in passing an adequate suctioning catheter; and increased dead space for the spontaneously breathing infant.

Other Equipment

There are many styles of laryngoscope blades from which to choose. The Forreger-Miller 0 for small prematures (less than 2,000 grams) and the Forreger-Miller one blade for the larger premature and full term infant used with a medium hook-on handle (C size batteries) have proven satisfactory. Keep the blade in the "off" position until ready to begin the actual tube placement.

Sterilized white pipe cleaners may be used as stylets for the endotracheal tubes if care is exercised to prevent injury by the wire end. Position the pipe cleaner in the tube so that one end extends almost to the bevel but does not protrude into the bevel opening. Bend the excess length of pipe cleaner over the adapter edge to form a hook that will prevent the pipe cleaner from sliding further into the tube. Shape the tube into a slight curve so that the bevel is in the same plane as the arc of the curve (Figure 1).

No. 8F and 5F suction catheters with thumb control and a source of vacuum controlled to deliver a negative pressure of 18-20 cm water, a hand resuscitator connected to a source of humidified oxygen, a Devilbliss 170 atomizer filled with 4% Lidocaine and an adjustable stool with castors complete the set up.

*Director of Newborn Services, Hennepin County General Hospital, Minneapolis, Minnesota.

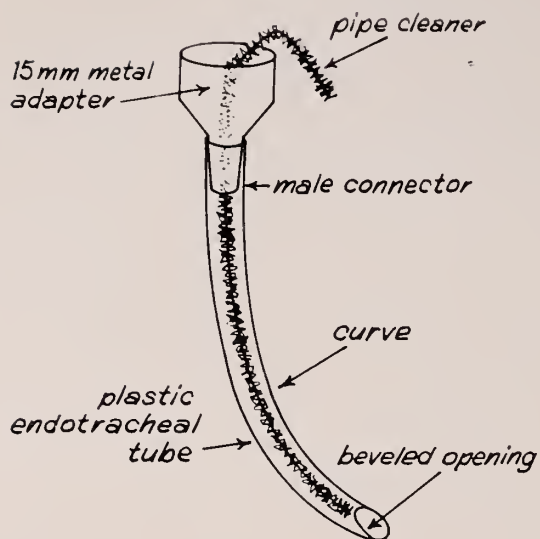


Figure 1. Endotracheal Tube

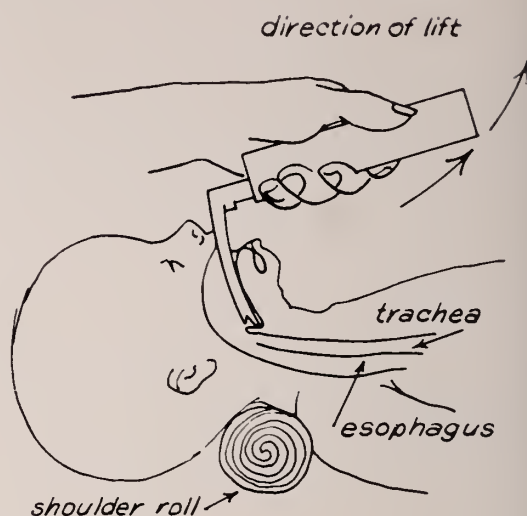


Figure 2. Laryngoscope in Place



Figure 3. Elastoplast

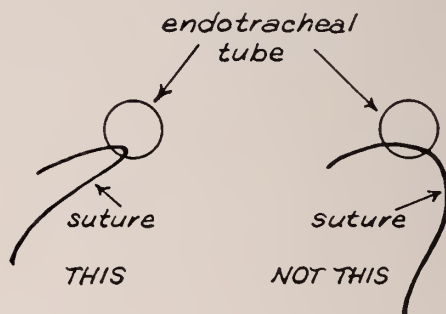
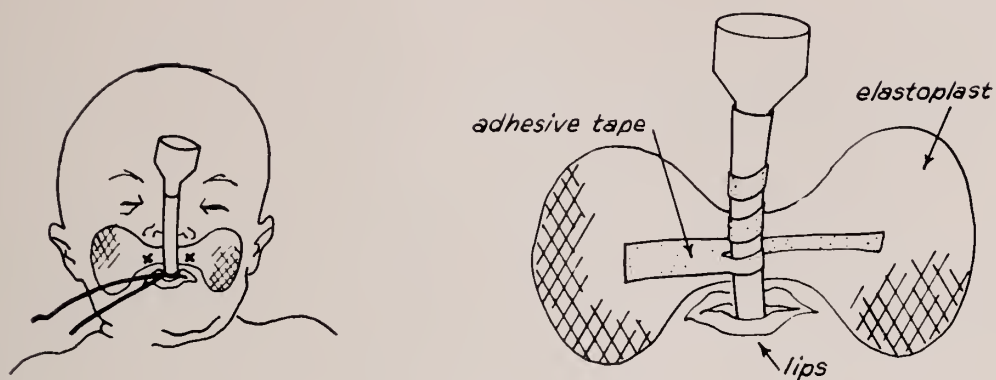
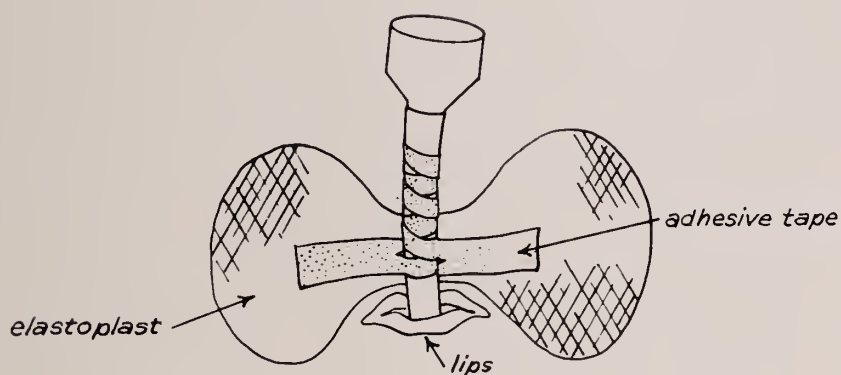


Figure 4. Suture in Wall of Endotracheal Tube Should not Obstruct Lumen



Suture in endotracheal tube ready to be sutured into elastoplast at points "X".

Tape in place with one half of strip wound around ET tube. (Expanded to show detail.)



Completed fixation of endotracheal tube.

Figure 5. Suturing and Taping Endotracheal Tube

Technique of Procedure

Position the baby on back with head slightly extended over a shoulder roll (Figure 2).

Clear secretions from the mouth and throat. Empty the stomach.

Holding the laryngoscope in the left hand, snap the blade into the "on" position, slide the blade into the left* side of the mouth angling from the corner to the midline at the base of the tongue. The slight curve at the end of the blade should slide into the valley between the epiglottis and the base of the tongue. When the epiglottis is visualized, lift the end of the laryngoscope blade to bring the larynx into view. Avoid using the upper lip and maxillary ridge of the infant as the fulcrum for this maneuver. It takes skill and strength to lift the blade by using the operator's hand as the fulcrum (Figure 2).

In the small premature infant, better visibility of the cords is maintained by keeping the blade in the side-to-midline position. Grasp the endotracheal tube adapter between the thumb and forefinger of the right hand. Introduce the ET tube from the right* corner of the mouth to the larynx in the posterior midline. Use a curving, pronating twist of the wrist to make the tip of the endotracheal tube follow the natural curve of the oral cavity. This should put the tube alongside the blade, but *not* in it, with the bevel tip right at the vocal cords. If the tone is poor, the cords will be gaping and the ET tube will slide into the trachea with no difficulty. If the cords are closed, wait for the next inspiratory effort to insert the bevel into the slit between the cords. Maintain the curving motion of the tube. Shoving the tube at the larynx will usually result in a misshapen piece of spaghetti over which the operator loses all control. If this happens, withdraw, reshape the tube in a curve and start over. Remove the stylet as soon as the tube enters the trachea. Hold the adapter securely in conjunction with the chin to prevent extubation and ventilate with the hand resuscitator. Check position by observing the rise of the chest and by listening over the stomach and over both sides of the chest during ventilation assistance. Breath sounds should be equal in both apices. If air rushes are heard over the stomach area then the tube is in the esophagus and not the trachea.

*Positions related to the operator's left and right as he faces the top of the infant's head.

Final position of the tip of the ET tube should be midway between the larynx and the carina. Confirm position with Xray and reposition immediately if necessary. A tube lodged in the right main stem bronchus compromises total ventilation and causes atelectasis in the nonventilated portions. It may lead to devitalization and infection if allowed to persist for several hours.

In the larger newborn, better control of the tongue will be obtained by bringing the handle end of the blade toward the midline position after the larynx is brought into view at the distal end of the blade. Overshooting the midline to the left narrows or obliterates the field of action. The maneuver for introducing the ET tube is the same for smaller infants.

When spasm of the cords prevents entry of the tube into the trachea, one quick topical spray with 4% Lidocaine to relieve the spasm is preferred to any attempt to force the tip between the cords. If Lidocaine is used, the tube should be left in place at least three to four hours until the protective reflexes of the larynx have recovered. The intubation procedure should not take more than 30 seconds.

Securing the Endotracheal Tube

For long term use, the endotracheal tube should be firmly secured to maintain proper position of the tip, to minimize functional stress from movements of the tube with each respiratory thrust and to reduce risk of accidental extubation.

Cover the eyes, paint the upper lip and cheeks with tincture of Benzoin. Allow to dry. Apply a butterfly of elastoplast cut to fit the face of the child. The wings of the butterfly should not extend over the lower eyelids nor should the crossbar be any wider than the upper lip. All edges should be within the area painted with Benzoin (Figure 3).

With the tube held in proper position, place a 4-0 silk suture in the wall of the tube at the level of the upper lip. Avoid obstructing the ET tube lumen with the suture stitch (Figure 4).

Tie, then wrap the suture around the tube and tie again. This prevents tension on the suture from cutting through the wall of the ET tube.

Next make a stitch in the elastoplast adjacent to the tube and tie firmly. Take another stitch about 1 cm away from the first; tie; wrap suture around the tube and tie once more. In tying the stitches into the elastoplast, pull snugly to fix the

be against that point of the upper lip. Clip the tracheal suture end. Further stability is added by using adhesive strips of tape three-eighths inch wide and three to four inches long, torn to within one inch of the end.

Place the broad portion of tape on the cheek and lip so that the crotch of the tear comes just directly at the suture point of the endotracheal tube. Begin the wind up around the ET tube at

the level of the suture in the tube. Make a smooth firm wrap with one strip and, beginning at the same level, wrap the other strip in the opposite direction. Do not cover the adapter rim with tape. A similar strip is applied from the opposite side (Figure 5).

Retaping may be necessary as secretions loosen the tape. The elastoplast and suture should stay for several days without need for replacement.

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It is a common effect of low spirits or melancholy, to make those who are afflicted with it imagine that they are actually suffering those evils which happen to be most strongly presented to their minds. Some have fancied themselves to be deprived of the use of their limbs, some to labour under acute diseases, others to be in extreme poverty; when, in truth, there was not the least reality in any of the suppositions; so that when the vapours were dispelled, they were convinced of the delusion. To Johnson, whose supreme enjoyment was the exercise of his reason, the disturbance or obscuration of that faculty was the evil most to be dreaded. Insanity, therefore, was the object of his most dismal apprehension; and he fancied himself seized by it, or approaching to it, at the very time when he was giving proofs of a more than ordinary soundness and vigour of judgment.*

*James Boswell: *The Life of Samuel Johnson* (age 20) 1791.

Historic Hospitals

Decline of the Arab Hospitals



Bonaparte Visiting the Pest-Ridden of Jaffa, by Baron Antoine Jean Gros. (Courtesy, Museum of Fine Arts, Boston.)

The maristans or hospitals which the Arabs developed from the ninth to the thirteenth centuries shared in the vigor of the period's civilization and participated in its decline thereafter. Since the hospitals depended upon their endowment properties or *waqfs* for support, they were particularly vulnerable to any adversities such as commercial reverses, destruction by warfare, or loss through embezzlement which diminished the value of their holdings.

By the end of the seventeenth century the resources of the last of the maristans were exhausted. Affairs at the once-proud Maristan of Qalaun at Cairo were deplorable. The specialists, pharmacists, and musicians, for which the hospital had formerly been famous, were now gone along with the generous daily allowance for each patient. The sick were left to recover as best they could.

Napoleon's Surgeon-General inspected the hospital in 1798 and found only twenty-seven sick patients, mostly victims of cancer, and fourteen insane confined in chains. Furnishings were limited to twenty-five wooden beds plus fifty stone slabs with holes in their centers for those incapable of walking to the latrine. The patients' diet consisted of bread, rice, and lentils.

Later in his Egyptian campaign Napoleon visited some of his plague-ridden troops being cared for in the hospital at Jaffa. The misery of the soldiers and the inadequacy of the hospital have been recorded by Antoine Gros in his well-known painting now owned by the Museum of Fine Arts in Boston.

The last to describe the operation of the Maristan of Qalaun was Edward W. Lane who visited there in 1847. Lane found the place being used for the confinement of the insane in cells, "each about seven or eight feet square, with a grated window." Shortly after his visit the Maristan ceased to be a hospital, the patients being transferred to the Mosque of Ibn Tulun.

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Alcoholism

Why Do Alcoholics Deny Their Problem?

JON R. WEINBERG, Ph.D.*

THE DENIAL SYSTEM of a person with alcoholism is notoriously well-known to anyone with even a passing acquaintance with the problem. The individual will not accurately report the quantity and frequency of alcohol consumption. The adverse behavioral consequences of drinking will be minimized, explained away, or denied completely. For example, violent fights with a spouse may be described as minor arguments, or explained as due to the mate's bad temper, or simply ignored altogether. From the standpoint of the helping professional or friend or relative, the alcoholic's denial is usually perceived as lying, a transparent ploy to escape responsibility for his harmful actions. The result most often is hostility, as people generally have an intense dislike for lying and irresponsibility in others. This paper is intended to help clarify the factors which produce and maintain the denial system, so that others may react helpfully rather than rejecting the alcoholic.

Three components may be identified as critical in generating the denial system, all of which are interdependent and interact with one another to maximize their impact. For convenience, however, they will be discussed separately under the headings Cultural History, Social Environment, and Intrapyschic Consistency.

Cultural History

Alcoholic behavior has been described throughout recorded history. As with mental illness, the rationale used by people over the centuries to explain grossly inappropriate behavior involved possession by demons (including demon rum) or similar forces of evil. The problem was then dealt with by punishing the individual whose mind was possessed. The nineteenth century saw the beginning of a shift in attitude toward those called insane, but to this day a social stigma is clearly evident for this group. The problem with alcoholism

is still more complex as a function of the enormous cultural ambivalence toward drinking. One of the dominant institutions of our society, organized religion, has influenced us so powerfully against alcohol as an evil that this century saw a successful attempt to legally proscribe its use on a national scale. The failure of Prohibition reflects the eternally continuing importance people attach to using mood-altering chemicals.

The great majority of people today do use alcoholic beverages and are culturally endorsed for doing so in their own peer group and by the enormous mass media pressure exerted by the liquor industry. At the same time, our history is one of applying a powerful moral and social stigma to those whose drinking produces sufficiently undesirable behavior to lead to the label "alcoholic." In short, we reinforce drinking but vilify victims of alcoholism. In spite of a few decades of trying to shift social attitudes from a view of the alcoholic as "an evil person who should be punished" to "a sick person who should be treated," this transition has barely begun. The mentally ill have a century advantage over alcoholics in this respect and are by no means free of stigma. (Note that wealthy people who act crazy are usually sent to a "rest farm" in the country or a general hospital to recuperate from a "nervous breakdown" or from "overwork," while the poor end up in state hospitals labelled schizophrenic).

In brief, alcoholics have historically been regarded as being evil, morally and/or mentally inferior, and thus subject to social punishments—disapproval, rejection, ostracism. Who wants to be placed in the category "alcoholic"? Nobody! This is how cultural factors set the stage for denial.

Social Environment

The section above noted that drinking is a highly prevalent behavior in our society, with the combination of social custom and advertising glamourizing alcohol use as an essential part of "the good life." For most people, drinking is a

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generally harmless activity secondary to various social occasions. For perhaps 8% to 10% of those who drink, however, alcohol use slowly shifts from a harmless to a harmful activity. The person's behavior gradually becomes increasingly inappropriate to the occasion. For example, a holiday gathering of a large family may be spoiled by his loud tirade directed at a sibling for some alleged old injustice. Perhaps an embarrassing scene occurs at a neighborhood party when she propositions her best friend's husband in front of everyone. Or again, he has the boss over to dinner hoping to win a promotion and ends up by telling him exactly where to go.

What will be the normal consequences of the undesirable behaviors cited? The answer is either *nothing at all* or at worst an admonishment the next day by the spouse. The latter may even suggest the desirability of drinking less, but the family or the friends and even the boss are very unlikely to say a single word to the individual (although they may be gossiping freely elsewhere). The budding alcoholic who may remember the incident fuzzily or not at all (a "blackout") is unlikely to accept the mate's version as accurate without other confirmation, and may impute her motives or otherwise rationalize it away. Faced with hostility from the drinker and lack of support from relevant others, the spouse most often takes the path of least resistance and resentfully tolerates the behavior. Worse, she may buy the common idea that his drinking is somehow caused by her inadequate behavior as a wife. She is even likely to cover up for him by making excuses for his behavior to others, e.g. telling the boss he's home sick with "flu" instead of a hangover. Thus reality is not being forcibly presented to the individual.

As adverse consequences of drinking gradually multiply, more people are introduced into the picture. A physician, marriage counselor, or clergyman may be consulted at the mate's insistence, after years of increasing family turmoil. What are the chances that alcoholism will be diagnosed and made a central focus? Minimal, as a function of inadequate training in alcoholism plus, often, systematic cultural biases against considering a person alcoholic until the late stages. Physicians may quietly suggest "cutting down" on drinking while writing a prescription for some other sedative drug which potentiates alcohol. Counselors may discuss "improving marital communication" and ignore the drinking as a "mere symptom." Clergy-

men may press for more regular church attendance and family togetherness. Here, "experts" are saying in effect that the problem is not alcoholism. Furthermore our social system is so structured that *the higher the income level the less probable alcoholism will be diagnosed.*

In summary, what are all the important people in his life, possibly excepting his mate, most often saying to the person with early-stage alcohol-related problems? *Nothing whatever about the harmfulness of his drinking.* They may be just plain ignorant about the early stages of alcoholism, believing alcoholics are winos in the gutter, never well-dressed businessmen and housewives; they may be too polite or too fearful of hostile reaction to discuss this socially embarrassing topic with the individual; or they may feel it's none of their business. The result of this innocent but deadly conspiracy of silence in the individual's social environment is to provide extremely fertile soil for denial of reality.

Intrapsychic Consistency

It appears to be a law of human behavior that two directly conflicting beliefs cannot co-exist for very long in one individual. As a person's drinking begins to produce adverse results, such a conflict is created. On the one hand, alcohol has become an important and rewarding component of his life. He likes to drink because it produces unusually good feelings and/or helps shut off bad feelings.¹ On the other hand, reality is relentlessly trying to impose awareness of impaired mate and family relations, work efficiency, etc. At this point there are only two possible resolutions of the conflict: reject drinking or reject reality. Some people do select the former, especially if he is one of the lucky few who has important people, such as family members or helping professionals, confronting him with the connection between drinking and undesirable reality. Many more, unfortunately, begin to reject reality, which is obviously the more likely alternative given the remarkable propensity of humans to rationalize whatever behavior they find highly rewarding.

Is the alibi system of the alcoholic really so different from that of the compulsive smoker who rejects the medical evidence for lung damage, the compulsive eater who says people like her better fat, the compulsive executive with heart disease who insists the corporation would collapse if he didn't put in 16-hour days? All of these people

have a specific delusion, a denial of reality, which serves the vital purpose of allowing the desired behavior to continue without overwhelming mental conflict. The primary reason people are sometimes more disturbed by the alcoholic's denial is that their behavior is relatively more harmful to other people, as opposed to being harmful only to himself (which probably also explains their higher recovery rate).

For the alcoholic, accepting reality is tantamount to working to maintain sobriety, and it is simply unreasonable to expect someone with a profound dependence on a substance to give it up without a struggle. The longer the history of dependence, the worse reality becomes, the more complete the denial must be, and the greater the struggle to modify the process. In the terminal stage, near death from cirrhosis, the alcoholic may deny any history of drinking whatever. Such pathetic outcomes can only be prevented by a widespread knowledge of the early symptoms of alcoholism² combined with a forceful confrontation with reality by all those deeply concerned with the developing alcoholic. In the early stages, such intervention will lead to a high proportion of successful outcomes.

Summary

The history of moral stigma associated with alcoholism provides the cultural context for denial. The tendency of family, friends, and helping professionals to avoid or overlook the issue in dealing with the alcoholic in the earlier stages provides the social environment which permits and encourages denial. The individual's normal tendency to avoid internal conflict fosters denial of unpleasant reality in order to permit the rewards of continued drinking. If the cultural attitudes toward alcoholism are successfully shifted to an illness-without-stigma model; and more importantly, if concerned persons are knowledgeable enough to see alcoholism developing *and* persistently confront the individual with reality; then far less problems will occur with the third, or individual, component. If the environmental reinforcements for denial are absent, the individual will have little opportunity to successfully generate a denial system. Until these changes occur, we will continue to be frustrated by the stubborn resistance to change of the advanced stage of denial most people associate with the illness of alcoholism.

References

1. Heilman Richard O: Dynamics of drug dependency. Minnesota Med 56:179, 1973.

2. Heilman Richard O: Alcoholism. Minnesota Med, 55:271, 1972.

Meetings

August 21—Southern Minnesota Chapter, American Academy of Family Practice. Summer Seminar. Program Chairman: A. D. Walden, M.D., 202 So. Main, LeSueur, Minn. 56058. Time: Aug. 21, 4 p.m., Country Club, LeSueur.

September 8—Minnesota Society of Anesthesiologists, Fall Scientific Meeting. Time: Saturday, Sept. 8, 10 a.m. Program Chairman: D. Keith Johnston, M.D., 1306 Hillcrest Drive, Mpls. 55432. Place: Marriott Inn, 1919 E. 78th St., Bloomington, Minn. Program: 10:30 a.m. Special Seminar "The Theory and Practice of Acupuncture 1973," Emerald Isles Ball Room. Scientific Program includes "Hypnosis and Suggestion as Clinical Tools for the Anesthesiologist," "Respiratory Maneuvers to Prevent Postoperative Pulmonary Complications" and "Recent Advances in the Surgical Management of Ischemic Heart Disease, with a "Look at the Future."

September 10—Lyon-Lincoln County Medical Society, Marshall, Minn. Time: 8 p.m. Speaker: Robert L. Telander, M.D. Subject: Common Problems Seen by GP in Pediatric Surgery.



Book Reviews

MEDICINE FOR THE PARAMEDICAL PROFESSIONS AND WORKBOOK FOR MEDICINE FOR THE PARAMEDICAL PROFESSIONS by Douglas W. Piper, Published by McGraw-Hill Book Company, Sydney, Australia, 1970.

Too many of the books designed for teaching the paramedical professions are devoted to either first aid or methods of transportation of the sick and wounded. This book provides a general review of medicine by organ system and is accompanied by a workbook with a programmed learning format.

The forward states that "to serve its purpose properly, a medical book must combine the readability of a current journal with the exactness and factuality of a reference book, and this is the aim of the group of young men who have combined to write this book." That the 38 authors succeeded is a tribute to the editors.

There are a few rough spots which will serve as minor annoyances—for example, Australian tradenames are used for many drugs and many of the abbreviations in the index are not explained in the text. Some Australian terminology also creeps in—for example, the use of the term morbilli instead of measles.

On the positive side, the color photographs in the dermatology section are excellent as are the illustrations.

I can recommend this book for teachers and students in the paramedical professions.

John B. O'Leary, M.D.
Minneapolis, Minnesota

VASECTOMY, SEX & PARENTHOOD by Norman Fleishman and Peter L. Dixon, Doubleday & Company, Garden City, New York, 1973—\$5.95.

This small book has been written, if one will pardon the expression, by laymen for the layman. It is a good book for prospective vasectomy patients. Vasectomy is discussed in detail, and favorable testimonials are given by several patients, including the authors. A wife's attitude towards her husband's vasectomy is related.

One note of caution relates to the only significant error in the book. This occurs in the discussion of sperm banking. The author states that sperm banking provides "insurance" for the man who is undergoing vasectomy. Unfortunately, they are unaware that sperm banking is still experimental at best. Capability of sperm banks has not yet been well established, and results of recent studies* indicate viability of frozen sperm drops off rapidly after one to three years of storage. Thus, prospective vasectomy patients should probably not expect more than two or three years "insurance" from storage of

their sperm.

There is an important discussion of all of the wrong reasons for having children, and also a brief discussion of male machismo and what constitutes masculinity. All of this is related to serious concern about our overpopulated polluted world. The personal and social costs of unwanted and unplanned children are reviewed. All in all, it is a good book for individuals considering vasectomy or in the process of deciding whether they should have children. It will help couples gain insight into the unconscious reasons why people have children and the personal and social morality which now all but demands that a couple limit their reproduction to two children or less.

Robert Benjamin, M.D.
St. Louis Park, Minnesota

*JAMA, February 12, 1973, page 778.

TEXTBOOK OF CORONARY CARE. Edited by Lawrence E. Meltzer and Arend J. Dunning. \$18.00. The Charles Press, Philadelphia. 1972. 820 pages.

Introduced only ten years ago, the coronary care unit has become an essential part of the therapy of patients with myocardial infarction. In addition, such developments as synchronized D. C. countershock, intravenous lidocaine, temporary and permanent transvenous pacemakers, and new surgical techniques have made the past decade a fruitful one in the treatment of coronary heart disease.

These topics and many others relating to coronary care are discussed in this book. In addition to the more accepted means of therapy, controversial topics are included, such as: Aortic balloon pumping in the management of cardiogenic shock, "Polarizing" solution, the resection of akinetic areas of myocardium ("infartectomy"). The editors have done a fine job in keeping the presentations brief but well-balanced and meaty. Duplication between authors is avoided. Particularly useful is a supplemental bibliography which includes references up to 1972.

This book will be of value to all who are involved in coronary care: physicians, students, and nurses. It should be on the bookshelf in the C.C.U. as well as in the medical library since it provides a wealth of practical information as well as more theoretical discussions. With the rapid development of new knowledge and techniques in this field it is likely that a new edition will be needed in a few years.

David A. Berman, M.D.
Minneapolis, Minnesota

The Family Physician

A Comparative Study of Minnesota and Wisconsin Family Physicians Practicing in Rural and Urban Communities¹

SUSAN E. JOHNSON, M.A.,* WALTER L. BAEUMLER, PH.D.† and
ROBERT E. CARTER, M.D.*

THE NEW UNIVERSITY OF MINNESOTA, Duluth, School of Medicine has identified as one of its special missions study of the educational process for family practice, particularly in rural areas of the upper midwest. This goal places the School of Medicine somewhat in opposition to the nationwide social and economic trends toward specialization and urbanization dominating the structure of medical practice. An institution committed to such purposes must examine special means it will employ in moving toward its goal. As one aspect of the Duluth School of Medicine's evaluation of new educational methods, the commitment was made to study certain behavioral and attitudinal characteristics of currently practicing rural and urban general practitioners as well as urban specialists.

The study herein reported in part was thus motivated by both a practical and a theoretical interest. The practical interest has to do with the School of Medicine's desire to maximize the probability that physicians receiving their initial training would indeed choose rural family practice as their final career choice. The assumption underlying the study was that variables characterizing present practitioners might prove useful in both the selection and socialization (training) of future practitioners.

This report presents the comparison of rural and urban general (family) practitioners. The comparison of rural and urban general practitioners with urban specialists will be presented in a second paper.

The present study contributes to the growing empirical literature exploring the relationship between medical practice locales and styles of medical practice.² This literature suggests the same

general conclusions as the present study: rural and urban physicians differ little in certain conditions of medical practice they experience. The difference between them emerges in the experiences of living within the social structure of a small community for the former, in a metropolitan community for the latter.

Methodology

Sixty rural general practitioners (RGPs) in the eleven northeastern Minnesota counties (40 respondents) and the ten northwestern Wisconsin counties (20 respondents) were interviewed during the summer and fall of 1971. A comparative sample of 58 urban general practitioners (UGPs) in Duluth (20 respondents) and Minneapolis and St. Paul (38 respondents), Minnesota, were interviewed in the fall of 1971. Both samples were randomly chosen from among the physicians who identify themselves as general practitioners in the American Medical Association's *Directory of Physicians, 1969*. The rural sample was drawn from towns with a population of 10,000 or less; the urban sample from cities of 100,000 population or more.

Both samples were stratified by age to assure the selection of younger doctors in the same proportion as their representation in the population and by number of physicians (including the respondent) practicing in the community, as this was thought to represent significantly different practice conditions. The interview required approximately one hour of each respondent's time to complete. More than 300 separate items explored various aspects of the physicians' life experiences, professional experiences, and attitudes. Items in the study found to reveal significant differences between the two samples are reported and discussed here. The chi-square test was used for analyzing the differences among nom-

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See editorial, page 689.

inal items and a five percent level of significance was used to separate differences not attributable to chance association.³

An educational institution can have an impact on the career choices of its graduates through two methods, selection of those most likely to work toward the specified outcomes and training of those chosen to a realistic appreciation of the demands of their possible professional role. The study was designed to explore material relevant to both selection and training. This report is thus presented in two complementary frameworks: (1) significant differences between RGPs and UGPs which might be applicable to selection policies of any medical school and (2) significant differences between RGPs and UGPs relevant to realistic training of students to the role of the family physician practicing in a rural setting.

Characteristics of the Sample

The tabulation of physicians' responses to demographic and practice questions is reported in Table 1. The great majority of both rural and urban physicians interviewed were male and married. The distribution of age for the two samples was remarkably similar. Slightly under one-half were between 41 and 60 years old, approximately one-quarter were 40 years old or younger and one-quarter 61 years old and older.

The distribution of respondents according to number of physicians practicing in the community reflects the study design. All urban respondents were drawn from cities of 100,000 population or more, a situation essentially guaranteeing that 100 or more physicians will practice in the community. The rural respondents were selected in such a way that the sample distribution of approximately 20 percent in communities with three physicians or less and 40 percent in communities with four physicians or more reflects the actual distribution of rural physicians in the universe as a whole. Slightly over half of the rural physicians practiced in towns with a population between 1000 and 5000. One third practiced in towns between 5000 and 10,000 population, and 13 percent practiced in the smallest communities, less than 1000 population.

The sampling of practice structures showed that slightly more urban than rural family physicians have solo practices (not a statistically significant difference). Approximately one-fifth of both groups practiced in a two-physician partnership, while half or more of each group practiced in groups of three or more.

Results Relevant to Selection Procedures

Both the rural and urban family physician samples were overwhelmingly *male* (98.3 percent and

TABLE 1
Characteristics of the Sample

	RGPs (N=60)		UGPs (N=58)	
	%	f	%	f
Age				
40 years old or younger	25.0	15	15.5	9
41 to 60 years old	46.7	28	46.6	26
61 years old or older	28.3	17	31.0	18
Not ascertained	—	—	6.9	4
Sex				
Male	98.3	50	93.1	54
Female	1.7	1	6.9	4
Marital Status				
Single, divorced, widowed	6.7	4	12.0	7
Married	93.3	56	86.2	50
Not ascertained	—	—	1.7	1
Size of Community Where Practice Located				
Less than 1000 population	13.3	8	—	—
1000 to 5000 population	53.3	32	—	—
5000 to 10,000 population	33.3	20	—	—
100,000 or more population	—	—	100.0	58
Number of Physicians Practicing in Community				
Three physicians or less	31.7	19	—	—
Four physicians or more	68.3	41	100.0	58
Structure of Practice				
Solo practice	30.0	18	34.5	20
Partnership (two physicians)	20.0	12	19.0	11
Group practice or clinic	50.0	30	39.7	23
Not ascertained	—	—	6.7	4

93.1 percent, respectively) and *married* (93.3 percent and 86.2 percent). The randomly-selected samples contained no blacks or Indians. Indeed none were found among the family physicians in the study area.

When asked their attitudes about whether or not a prospective general practitioner should be male and married,⁴ urban general practitioners felt less strongly about maintaining the status quo; a majority of them in each case indicated that a new doctor entering a practice such as theirs "may or may not" possess these attributes.⁵ A slight majority of the rural general practitioners (56.7%) felt a doctor "preferably should" be married, and 45% stated such a doctor should be male. The difference between RGP and UGP attitudes on physician marital status was significant at the 0.05 level. Majorities in both groups felt a doctor need not be white.

More significant differences were found when we looked at selected life experiences of the two groups.

The cluster of variables most closely associated with rural rather than urban general practice was the *size of the community of origin* of the doctor. Doctors who practiced in communities of less than 10,000 population were far more likely to have grown up in such communities than are doctors practicing in cities of 100,000 population or more ($X^2 = 19.5$; $df = 1$; $p < 0.001$). As shown in Table 2, this relationship holds true when doctors were asked about the size of community in which they spent their *pre-school years*, their *primary school years*, and their *secondary school years*. The increasingly rigorous levels of significance suggest that this difference becomes more evident as age of the youngster increases. The interpretation can be offered—though longitudinal data would be needed to demonstrate it—that the longer the young person who will become a doctor remains in his small community, the more likely he will be to return to such a small community to practice.

No significant differences were found between rural and urban family physicians with respect to the *geographical location of their community of origin*. Equal percentages of rural and urban general practitioners came from Minnesota and Wisconsin (60% and 65%), from other upper mid-west states (11.7% and 3.4%), and from other states or foreign countries (21.7% and 20.6%).

The respondents' *attitudes* toward items deal-

ing with size of community of origin also showed significant differences. Rural general practitioners were more likely to value a new doctor with a rural or small town background and to discourage a new doctor with a city background. Neither group found it important that a new doctor be a native of this region (80% of RGPs and 74.1% of UGPs responded "may or may not.") (Table 3).

TABLE 2
Size of Practice Locale Related to Size of
Physicians' Community of Origin
Size of Community

	Less than 5000	5000 to 100,000	Greater than 100,000
Pre-School Years			
RGPs	29	16	10
UGPs	18	9	25
$X^2 = 12.9$; $df = 2$; $p < 0.005$			
Primary School Years			
RGPs	27	19	9
UGPs	15	10	27
$X^2 = 16.7$; $df = 2$; $p < 0.001$			
Secondary School Year			
RGPs	31	19	6
UGPs	10	8	34
$X^2 = 34.5$; $df = 2$; $p < 0.001$			

TABLE 3
Physicians Attitudes Toward Size of
Community of Origin

Attitudinal Responses		
	Preferably Should	Neutral or Preferably Should Not
Preference for Small Town or Rural Background		
RGPs	28	32
UGPs	5	50
$X^2 = 19.9$; $df = 1$; $p < 0.001$		
	Neutral or Preferably Should	Preferably Should Not
Preference for Large City Background		
RGPs	38	22
UGPs	54	0

The size of the community of origin is also significant when the *spouse's community of origin* is explored. As Table 4 demonstrates, RGPs' wives are more likely to have come from towns of under 10,000 population.

TABLE 4
Size of Community of Origin of Physicians' Wives
Size of Community

	Less than 10,000	More than 10,000
RGPs	32	21
UGPs	11	38
$x^2 = 15.0$; $df = 1$; $p < 0.001$		

No significant differences between RGPs and UGPs were found with respect to *father's education*. Though UGPs' fathers had slightly more education up through high school, more RGPs' fathers in our sample had some college or professional training after high school. Twenty-three percent of RGPs' fathers and 24% of UGPs' fathers were college graduates or had postgraduate training. The pattern for *mother's education* is similar and also shows no significant difference between RGPs and UGPs. Fifteen percent of RGPs' and 10.3% of UGPs' mothers graduated from college or had post-graduate training. This is in sharp contrast with findings in the urban specialists group to be reported subsequently.

Differences in *father's occupation* were significant. RGPs are far more likely to have fathers who were farmers or blue collar workers; UGPs, fathers who were white collar workers. When the full array of occupational categories is examined, UGPs' fathers were more often professionals or white collar workers, while RGPs' fathers were more likely to be farmers or skilled workers ($\chi^2 = 14.0$; $df = 6$; $p < 0.05$). Whether or not the father's occupation was health-related did not differentiate between our two groups. Nor did either *mother's occupation* or *mother's occupation health-related*.

TABLE 5
Occupation of Physicians' Fathers
Occupational Categories, Collapsed
White Collar Non-White Collar

RGPs	29	28
UGPs	40	12
$\chi^2 = 8.0$; $df = 1$; $p < 0.005$		

Results Relevant to Socialization Factors

The doctors were asked what factors were most important in their decision to establish a practice in the community they chose. More UGPs than RGPs said the *most significant factor in choice of practice community* was either that they were born or raised in that community or held an internship, preceptorship, or residency in the community. RGPs are more likely to mention particular geographical features of the community, its climate and recreational opportunities or medically-related features, such as particular facilities or practice structures ($\chi^2 = 18.0$; $df = 5$; $p < 0.01$).

The large size of the UGPs' practice sites makes it more likely that they would have been born in the same city where they now practice and that they could have held an internship or residency

there. Indeed, more UGPs than RGPs received their internship training in Minnesota or Wisconsin, while nearly half the RGPs received this training in another state (33.3%) or another upper midwest state (10%; $\chi^2 = 8.8$; $df = 2$; $p < 0.05$).

The RGPs, on the other hand, though born in a town much the size of their own, are oriented more to a geographical region than a particular city. They also found access to particular medical facilities more salient than did UGPs who had available to them the larger range of facilities and structures within a metropolitan area.

The importance of geography, climate, and recreation to the RGPs was also apparent in their attitudes toward a related item. RGPs were far more likely to advocate a new doctor being interested in *outdoor recreation* (58.3% said preferably should; 3.3%, absolutely must) than were UGPs (15.5% said preferably; none responded absolutely must; $\chi^2 = 24.9$; $df = 2$; $p < 0.001$).

The assumption that the styles of medical practice of rural and urban physicians differ substantially was *not* borne out in the study. Rural and urban general practitioners did not differ significantly with respect to most of the professionally oriented variables that were explored.⁶ No statistically significant differences were found in *structure of practice*, *number and quality of support personnel*, *adequacy of medical facilities*, *income*, or *income discrepancies* between these doctors and specialists, *job satisfaction*, *family satisfaction*, *degree of worry*, *proportion of time spent on house calls*, or *length of vacations*. Nor did the doctors' attitudes toward medically related attributes or behavior differ significantly.

Two aspects of RGP and UGP professional practice were interesting. These have to do with *time demands* and *referrals*. RGPs worked longer hours than UGPs. Over half the RGPs (56.7%) estimate they worked between 60 and 80 hours per week, while 36.2% of UGPs do so. Fifty percent of UGPs worked between 40 and 60 hours per week. Only 31.7% of RGPs do so. Thus, although both groups worked long hours, higher time demands were made on RGPs. Also, RGPs saw more patients in their working day, either in their offices or on hospital rounds, than did UGPs. Nearly one-quarter of RGPs saw between 50 and 70 patients per day, while only 5% of UGPs saw this many patients. The mode for both groups was between 30 and 50 patients per day.

A reflection of this differing work load is found in the doctors' attitudes toward *schedules* of hospital rounds and office appointments in their practice. A plurality of RGPs say a doctor preferably should be flexible (not attempt to maintain exact schedules) while a plurality of UGPs said he preferably should maintain exact schedules ($\chi^2 = 15.6$; $df = 4$; $p < 0.01$).

A statistically significant difference in the two group's styles of practice had to do with their *need for referrals*. A majority of both groups found they need to refer fewer than 10% of their cases to specialists. However, over three-quarters of RGPs refer this small proportion of cases, while 50% of UGPs do so. About one-third of UGPs refer between 10 and 25% of their cases, while only 16.7% of RGPs refer this many cases.

TABLE 6
Physicians' Perceptions of Frequency of Referrals
Proportion of cases which need
to be referred

	Less than 10 per cent	More than 10 per cent
RGPs	47	10
UGPs	30	22

$\chi^2 = 7.95$; $df = 1$; $p < 0.005$

This pattern of referrals appeared to reflect comparative isolation of RGPs and thus the emphasis in their practice on handling relatively more problems locally. In open-ended responses, rural physicians emphasized the importance of training students to handle emergencies, to rely on themselves, to know what they can and cannot do, to develop self-confidence in their abilities, to realize that they and they alone will often be faced with the unexpected, yet will be expected to handle it.

With the sole exception of these referral patterns and certain time demands, rural and urban general practice attitudes and conditions appeared to differ little. The real differences between small town and big city general practice had to do instead with the nature of life in a small town. Many significant differences were found between the attitudes of the rural and urban respondents with respect to behavior desirable of a new doctor in the community.

Most urban respondents answered "may or may not" to the items discussed below. The rural respondents, however, felt a new doctor preferably should be a *homeowner*, *spend his money in the community*, *attend school or athletic activities of his children*, *have his wife be active in the com-*

munity, *lecture to school or community groups*, and *hire his staff from the local community*.

Several items related to community life were more salient for these rural physicians, as evidenced by the fact that they did not agree on the proper way to handle them. The issue of whether or not a doctor should be an *active member of a political party* was more salient for the RGPs, significant minorities of whom felt either that a doctor preferably should or that he preferably should not be an active member. UGPs again said may or may not ($\chi^2 = 6.3$; $df = 2$; $p < 0.05$). Nearly 40% of UGPs said a doctor may or may not keep a watchful eye on the *personal lives of his staff*. Less than one-quarter of the RGPs (23.3%) were this neutral about the issue. Fifty percent of them said a doctor preferably should not or absolutely must not keep a watchful eye, but 23% said he preferably should or absolutely must. RGPs are also more ambivalent about whether or not a doctor should *counsel patients about non-medical matters*. Only 12% of RGPs are neutral about this issue, 60% of them believing a doctor should or must do so, 28.3% saying he should not or must not. Seventy percent of UGPs are neutral or say he preferably should.

Thus, various aspects of the on-going life of the community are regarded as more critical and problematic factors by the rural than the urban general practitioners.

The patterns of the doctors' friendships also indicate the degree to which rural behavior is molded by the nature of the community. The doctors were asked to report the *occupation of their best friend in the community*. Sixty-three point eight percent of the urban doctors named another professional as their best friend, while only 38.3% of rural doctors did so. Twenty-five percent of rural doctors named a friend in the managerial, proprietor, or official occupational category, while only 3.4% of urban doctors named such a person ($\chi^2 = 14.110$; $df = 3$; significant at .01 level). Thus, though among both groups professional friends are important, a large number of rural doctors also develop their most significant friendships with local store owners and managers, the people they do business with every day.

Summary

The variables which most clearly differentiated rural and urban family physicians had to do primarily with their differing degrees of prior expe-

rience with rural or small town communities and their differing degrees of present involvement in the life of their community.

The significantly different *selection variables* demonstrate that rural family physicians were more likely than urban family physicians to: (1) come from a small town or rural area, (2) have wives who also came from a small town or rural area, (3) believed such a background is important, (4) chose their practice site because of particular geographical or medically related features it offered, and (5) believed an appreciation of the outdoors is important. In addition, rural physicians were more likely⁶ to have fathers who were farmers or blue collar workers.

The significantly different *socialization variables* revealed that rural family physicians differed from urban family physicians in that they: (1) worked longer hours and saw more patients, (2) referred fewer patients to specialists, (3) found keeping to rigid schedules more difficult and less essential to perform their role, (4) felt it was important to involve themselves in the community in many direct and personal ways.

The rural physicians seemed more concerned than their urban counterparts about whether or not a doctor should be an active member of a political party, watch over the personal lives of his staff, and counsel patients about non-medical matters. Lastly, rural family physicians were more likely than urban family physicians to have their closest friend in the community a non-professional person.

What appeared to distinguish rural from urban family physicians—and what perhaps may apply to selection and socialization of students for rural general practice—were not differences in attributed characteristics or conditions of medical practice. Rather, it was the individual's experience with and understanding of the nature of life in a small community, a life the rural physician intimately shares with his neighbors.

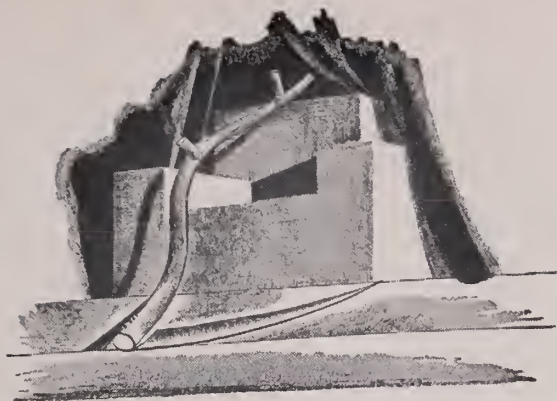
A major portion of this study was made possible through the generous support of the Peavey Company of Minneapolis, Minnesota as part of their continuing interest in improving the quality of life in the smaller communities of the upper midwest.

Notes

1. This is the first report of a projected series of comparative studies underway at the University of Minnesota, Duluth, School of Medicine which will explore the attitudes and behaviors of groups whose members play significant but different roles in the health care system. Groups to be studied in the future include physician specialists, naive and informed consumers, and patients. Such a long-term study involves the considerable efforts of many people whose degree of responsibility for any particular aspect of the study is not well reflected in the limited status of "authorship." The authors of this particular phase would thus like to acknowledge their indebtedness to Caryl B. Bentley and Wayland R. Swain, School of Medicine; Philip C. Campbell, Department of Sociology; and John Blair, Department of Sociology, University of Michigan. In addition, appreciation is due the other members of the faculties of the School of Medicine and Department of Sociology, all of whom contributed in some important way to the study.
2. Special thanks are given to the Minnesota and Wisconsin physicians who shared generously with us their time and thoughts and to Dr. E. P. Donatelle, President, Minnesota Academy of General Practice, and Dr. George V. Murphy, President, Wisconsin Academy of General Practice, for their support and encouragement.
3. For example, see Breu, TM: Geographical and Professional Characteristics of Illinois Health Manpower—Distributional Factors and Determinants, Southern Illinois University, unpublished doctoral dissertation, August, 1972; Hassinger, EW: Background and Community Orientation of Rural Physicians Compared with Metropolitan Physicians in Missouri. Research Bulletin Number 822, University of Missouri College of Agriculture, August, 1963; and Parker, RC and Tuxill, TG: The Attitudes of Physicians Toward Small Community Practice. JME 42:327-344, April, 1967.
4. When responding to such attitudinal items, the physician respondent can be interpreted as playing a dual role: that of subject, in which case his responses indicate the climate of opinion within which new family physicians would operate; and, that of informant, in which case his responses advocate various policy considerations.
5. Attitude questions were phrased: "Suppose you wanted to leave your practice in this community. What kind of doctor would you recommend should take your place? Should this person be . . . ?" Possible responses were: "Absolutely Must, Preferably Should Not, Absolutely Must Not." The form for such attitude items is adapted from Gross, N, Mason, and McEachern, A. Explorations in Role Analysis. John Wiley and Sons, 1958.
6. A 1963 study of rural/urban physician differences in Missouri confirms this finding. One of the author's principal conclusions is that, "practice in the rural area is not so different, in terms of technology available, from practice in the city." Hassinger, *op. cit.*, p. 83. Further, the author finds no differences between rural and urban physicians in memberships on hospital staffs, working relationships with other physicians, or membership and participation in professional organizations. *Ibid.*, p. 105.
7. See the occupational categories in Lipset, SM and Bendix, R. Social Mobility in Industrial Society, University of California Press, 1964, p. 50; and in Barber, B. Social Stratification. Harcourt, Brace and World, 1957, p. 174. The category system used in the present study is an adaptation of these two scales.

Minnesota-Dakota-Manitoba Orthopaedic Society

Minnesota-Dakota-Manitoba Orthopaedic Society, 49th Annual Meeting, September 14 and 15, Sioux Falls, S.D. For information about membership and all other questions contact Ed Kelly, Min-Da-Man Central Office, 120 North Snelling, St. Paul, Minn. 55104. Phone: 612-646-2533. All board eligible and board certified orthopaedists in this area are welcome to be members. Place: Holiday Inn Downtown, 100 W. 8th St., Sioux Falls, S.D. 57102. Scientific Program: Begins 1 p.m. Sept. 14.



In Memoriam

WALTER R. RAMSEY, M.D.

Dr. Walter Reeve Ramsey, 100, one of the first pediatricians in St. Paul and the founder of Children's Hospital in St. Paul, died March 11. He was born on a farm near Rockwood, Ontario, went to college in Guelph, Ontario, and came to Duluth when he was 21 years old. Later in 1893 he entered the University of Minnesota Medical School and received a doctor's degree in 1896. Later he studied at Johns Hopkins and in Vienna and Berlin.

During World War I, he served in France and his work for children brought him honors from the French government. In Rouen, France, he was instrumental in the establishment of a children's hospital, a maternity hospital and an orphanage. It was while he was on a European trip that he visited the famous Dr. Rollier's Children's Hospital in the Alps which was his inspiration for founding the Children's Hospital in St. Paul.

He was a member of the American Medical Association and the Ramsey County Medical Society and a 50 Club and Associate Member of the Minnesota State Medical Association.

Dr. Ramsey is survived by his son, W. Reeve Ramsey.

HAROLD S. DIEHL, M.D.

Dr. Harold S. Diehl, dean of the University of Minnesota College of Medical Sciences for 23 years and chief medical officer of the American Cancer Society for 10 years, died June 27 in St. Paul at the age of 81.

Born in Nittany, Pa., in 1891, Dr. Diehl entered the University of Minnesota Medical School in 1914. After graduation he served as an intern and physician with the armed forces in France and after World War I he was on the Red Cross staff in Poland.

In 1921 he returned to the University to direct the Student Health Service. He also organized the first department of preventive medicine and public health in the Medical School a year later. Dr. Diehl was one of the organizers of the American Student Health Association, serving as president from 1927 to 1929.

During this period he initiated tuberculosis control through a mandatory tuberculin test for all students entering the University.

Upon his retirement as dean in 1958 he became the senior vice president for research and medical affairs and deputy executive vice president of the American Cancer Society (ACS).

Dr. Diehl was actively involved in many professional organizations and authored more than 200 scientific papers and several books, including a new edition of his popular textbook "Healthful Living" just re-released by

McGraw Hill. First published in 1935, the book was one of the first health books widely used at universities and colleges in this country. He was a member of the Hennepin County Medical Society, the American Medical Association and a 50 Club and Life Member of the Minnesota State Medical Association.

Dr. Diehl is survived by a son, Dr. Antoni Diehl of Kansas City and a daughter, Annabelle.

ADAM M. SMITH, M.D.

Dr. Adam M. Smith, 79, Minneapolis internist, died May 31. Born in Minneapolis, Dr. Smith graduated from the University of Minnesota Medical School and interned at Minneapolis General Hospital.

A former Associate Clinical Professor of Medicine at the University of Minnesota, Dr. Smith was also a member of the Hennepin County Medical Society and the American Medical Association, and a 50 Club and Life Member of the Minnesota State Medical Association.

In 1938 he spoke before the Third International Goiter Conference in Washington and described the successful treatment of exophthalmic goiters by deep X-ray.

Dr. Smith is survived by his wife, Helen, and son, Dr. Alan G. Smith of New York.

OTTO BERGAN, M.D.

Dr. Otto Bergan, 89, Clinton physician, died May 1. Born in Rock Dell, Minnesota, and educated at the University of Minnesota Medical School, Dr. Bergan began his medical practice in Clinton in 1914.

He was a member of the West Central Minnesota Medical Society and the American Medical Association, served on the boards of both the Ortonville and Graceville hospitals, and was a Life and 50 Club Member of the Minnesota State Medical Association.

Dr. Bergan is survived by his wife, Cora, and two sons, Dr. Donald Bergan of Fargo and Dr. Robert Bergan of Duluth.

ELMER H. HARTUNG, M.D.

Dr. Elmer H. Hartung, 63, medical practitioner in Claremont for the past 39 years, died May 6. He was born in LeSueur and moved to St. Paul at the age of 14. A graduate of the University of Minnesota Medical School, Dr. Hartung also served several years as the Dodge County Health Officer.

He was a member of the Steele County Medical Society, the American Medical Association and the Minnesota State Medical Association.

Dr. Hartung is survived by his wife, Beth, and two sons, Brian and Donald.

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Replies to advertisements with key numbers should be mailed in care of Minnesota Medicine, 375 Jackson, St. Paul, Minn. 55101.

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SHELL LAKE CLINIC, LTD., Shell Lake, Wisconsin, expanding to seven man group. Three family physicians and one surgeon desire additional two family physicians and one internist. New 70 bed general hospital adjoins clinic. Excellent remuneration in corporate practice. City surrounds one of largest and finest swimming and fishing lakes in Northwest Wisconsin. Call 715-468-2711 or write to Clinic Manager Darrell Bailey.

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Salmonella Typhimurium Gastroenteritis

Statewide Outbreak

D. S. FLEMING, M.D.,* JAN PAPRA,† MARY ANN STOFFELS,‡ and RUSSELL HAVIR‡

DURING APRIL AND MAY 1972, Minnesota reported increased numbers of salmonella typhimurium isolations compared to earlier months in 1972 and similar periods in 1971. Increased isolations were also noted in Wisconsin, Michigan and Illinois. In Minnesota, cases were identified in 20 counties, but the majority were in the metropolitan area with clustering in the lower socioeconomic areas. Typically, the clinical picture was like dysentery. All ages were affected. The majority of reported cases were hospitalized. A preliminary survey of 13 cases failed to identify a common source. In many households multiple cases were observed.

A sample of isolates from Minnesota (10/12) and from Wisconsin (6/6) were found to be Phage Type II and failed to utilize Jordan's tartrate. These common properties suggested a common source and prompted further investigations.

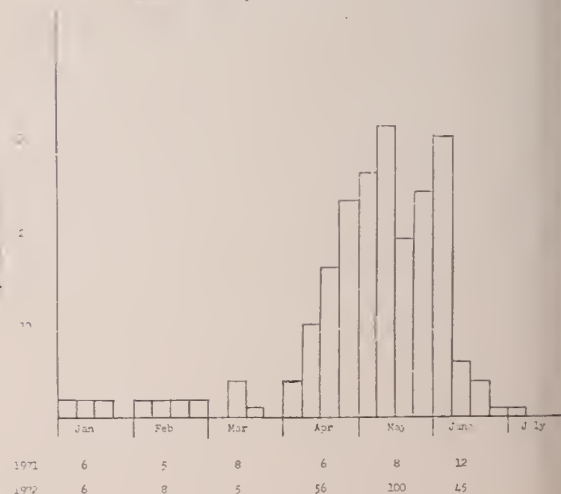
The common source character of the outbreak is evident from the epidemiological curve (Figure). Most cases occurred over the six week period in May and early June. Cases were reported in 20 counties. There were only eight counties which reported two or more cases. Eighty-eight percent of the cases occurred in the Minneapolis-St. Paul area (including the surrounding five counties) and in Olmsted County, an area which comprises 47% of the state's population. The attack rate statewide was 5.6 cases per 100,000 population. The highest attack rate was in Olmsted County, 17.8.

The first Salmonellosis Case Investigation Survey of 46 cases and 36 controls, using epidemiological investigation, failed to identify any food item or other common exposure which was clearly

associated with illness. There were three items on this list which were commonly consumed by both cases and controls and it was not possible to exclude them from consideration since almost everyone who was ill had been exposed. Furthermore these items were general food items and it was possible that some specific brand or type was involved. These items were milk, eggs and hamburger. A large number of other food items were excluded because of the large number of ill persons who had not been exposed making the attack rates between the exposed and not exposed groups insignificantly different.

Hamburger exposure became the focus of a second survey when investigations in Wisconsin identified raw beef as a significant item. In this second survey the probability of illness increased as the amount of hamburger consumed in the home increased. At eight hamburger meals per month this difference became significant when compared to persons eating less. This difference in attack rates was not observed for steak, roast, poultry or for any item eaten at restaurants. Raw

CASES OF SALMONELLA TYPHIMURIUM BY DATE OF REPORT
Minnesota - January - June 1972



Figure

*Director, Disease Prevention and Control, Minnesota Department of Health, Minneapolis, Minnesota.

†Deputy Director, Immunization Program, Minnesota Department of Health, Minneapolis, Minnesota.

‡Program Representative, Immunization Program, Minnesota Department of Health, Minneapolis, Minnesota.

beef eaters were identified and their attack rate was significantly higher than the attack rate for those not eating raw beef. Including those cases excluded because of possible sources other than common exposure increased the significance of the differences between exposed and not exposed attack rates for hamburger and raw beef consumption but did not affect the differences in attack rates for other food items.

A significant number of unreported cases were uncovered. In the 72 case households surveyed for this possibility, 60 unreported cases were discovered and among non household contacts, 24 additional cases were discovered. The unreported household cases were either co-primary cases (32), secondary (2), or had unknown timing. In 16 households there was contact with a case outside of the household within 72 hours of illness.

Symptoms of reported cases were severe with dysentery-like illness, high fever, severe cramps, diarrhea, the most common symptoms. In addition many patients had nausea and vomiting and some had bloody diarrhea. Most of the reported cases had been hospitalized. A few were considered to be extremely toxic and severely dehydrated. No deaths were reported in Minnesota although there were several in Wisconsin. The illnesses of the unreported cases were milder, many with diarrhea alone. It was expected that only the sickest persons would have stool cultures and hence be reported.

Examination of the stores and distributors supplying beef to cases and controls was nonproductive. Twelve stores provided beef to two or more case households. There were some significant differences but it was not possible to trace these differences back through the store's sources of beef. No significant differences could be identified on this level. For the purpose of these calculations a case or control, exposed to multiple stores, was scored as one exposure for each and the exposures for each store were added to the list of each of their distributors. It was learned that there was a great deal of trading off between each of the suppliers and the stores themselves would vary their suppliers depending on market prices and other factors.

Salmonellosis is an important cause of death among baby calves. Over the first six months of

1972 there was a two fold increase in isolates of salmonella typhimurium at the State Veterinary diagnostic laboratory when compared to 1971. In addition a significant increase in isolates of salmonella typhimurium from free flying birds (such as sparrows) has been reported over the past year. Salmonellosis in other animals, used for food, has fallen under tight regulation and is thought to be a diminishing problem in this region. Other than among baby calves, state veterinarians have not recognized any recent outbreaks of salmonellosis among livestock.

Discussion and Summary

A common source outbreak of salmonella typhimurium has been described epidemiologically. Two hundred and twenty laboratory confirmed cases occurred in Minnesota over the first six months of 1972. Hamburger and raw beef consumption was clearly associated with illness, epidemiologically, but this association was not confirmed with isolations of this organism from beef. Two factors significantly interfered with this investigation: the abrupt termination of the epidemic during the first week of June, at the time the investigation was getting under way, and the long delay interposed between illness and investigation. The former prevented product surveillance and the latter blocked the collection of left over food and muddled the data with failing memories.

Beef distribution is a maze and we were not able to trace cases back through this maze to packing houses where the problem probably originated. The salmonella typhimurium isolated from baby calves were uniformly tartrate positive and hence unrelated to the outbreak in humans. No other epizootics among animals were recognized. It appeared more likely that a breakdown in handling of beef was responsible for this outbreak rather than an epizootic, but this breakdown was not identified.

This outbreak emphasized the potential for widespread outbreaks of food borne illness to occur as the result of contaminated commercial products and, like others, to elude definitive explanation. It is likely that multiple factors play a role in bacteria reaching the consumer (in sufficient numbers to cause illness). Original contamination plus time and temperature all have a role and do not stay together for long.

Staphylococcal Pyomyositis

JAMES D. FETT, M.D., M.P.H.*

ONE OF THE MOST interesting features of bacterial pyomyositis, a common staphylococcal infection reported from many tropical areas,¹⁻⁶ is the remarkable infrequency of the disease in temperate climates although the latter has been reported.⁷⁻⁹ The following study is presented to supplement recent American literature^{8,9} in relation to this subject and to further acquaint physicians with this entity.

Case Report

Twenty-two cases of pyomyositis presented to the Vanga Evangelical Hospital, Vanga, Zaire (formerly Congo), Africa, during the one-year period from March 1971 to February 1972, represented just under one percent of all admissions to the surgical and medical pavillons.

All patients were Bantus. There were 13 males and nine females. Age range was four to 60 with a mean age of 30. Only one patient was a child. In only one case was a definite history of trauma elicitable. No seasonal incidence could be detected. Clinical presentation is indicated in the Table. Distribution of the involved muscles is indicated in the Figure. There were two deaths.

Limited laboratory evaluation revealed leucocytosis up to 21,400 WBC/mm³ in 11 of 17 patients (64.1%). In 13 cases Gram smears obtained of aspirated pus were positive in all cases for Gram positive cocci. Cultures

were obtained in only eight cases† and all grew out coagulase positive *Staphylococcus aureus*.

Hospitalization ranged from five to 34 days with a mean duration of 13.5 days. Routine management included aspiration of suspected areas for pus followed by incision if the aspiration was positive. Aspiration was positive for pus in 17 of 19 cases. In all but one of these subsequent incision resulted in drainage of pus, the quantity varying from a few ccs to over 1 liter. Resolution without drainage occurred in three cases.

Routine antibiotic treatment consisted of 1,200,000 units of Procaine Penicillin G daily in two dosages. Chloramphenicol was used additionally in two cases with prolonged course of illness and methicillin was used in one case. Incidence of penicillin-resistant staphylococci was not known and the use of beta-lactamase-resistant penicillin was very limited because of availability and economic factors.

Discussion

In the overwhelming preponderance of cases of tropical pyomyositis when cultures have been done *Staphylococcus aureus* is found.^{2,4,5,10} Only rarely have other organisms been cultured.^{5,10,13}

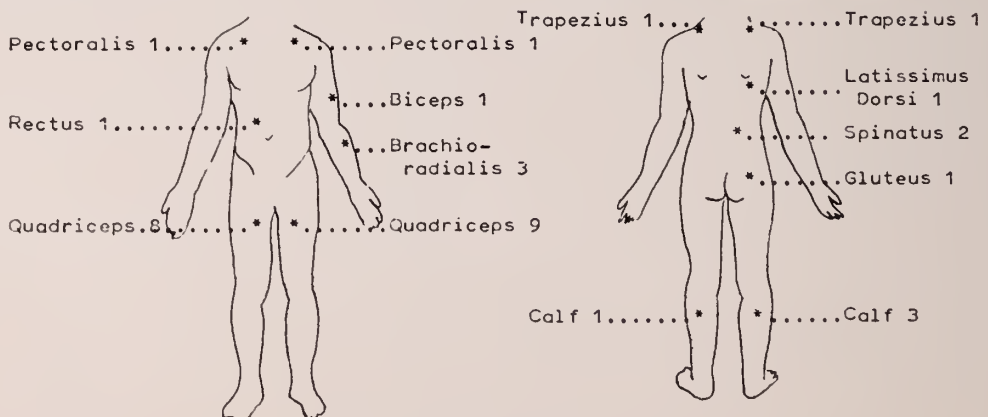
TABLE
Symptoms and Signs in 22 Cases of Pyomyositis

	Number of cases
Pain	22 (100%)
Tenderness to palpation	22 (100%)
Fever	21 (95.5%)
Localized swelling	21 (95.5%)
Localized heat	13 (59%)
Fluctuance	5 (23%)
Solitary lesion	13 (59%)
Multiple lesions	9 (41%)
2 abscesses	5
3 abscesses	4

*Vanga Evangelical Hospital, Vanga, Republic of Zaire, Africa, and University of Minnesota Unit in Internal Medicine, Northwestern Hospital, Minneapolis, Minnesota.

Reprint requests should be addressed to: Dr. James Fett, 221 So. Madison, Pierre, South Dakota 57501.

†We were able to develop culture facilities in our rural hospital only after the beginning of the study.



Figure—Distribution of lesions.

In Staphylococcal pyomyositis the accumulation of pus is always intramuscular within the confines of the deep fascia. Pus, varying from a few ccs to over a liter, is creamy greenish-yellow. We did not find the reddish-purple pus as described by Robin,⁵ possibly because our patients presented earlier.

Numerous predisposing causes have been suggested, including Vitamin C deficiency, sickle cell anemia, multiple small trauma, malnutrition, parasitoses including filariasis, ankylostomiasis, malaria, ascariasis; but none of these has been demonstrated conclusively to be related.^{1,3-6,10}

Tropical climatic conditions seem to play an important role in view of the relative rarity of the disease in temperate climates and the absence of the disease in tropical areas at high altitude only short distances removed from low-altitude regions where the disease is common.^{1,3,4,6}

The clinical triad of pain with movement, fever, and localized swelling, appearing in that order, is the usual finding. Contrary to the report of Levin et al.⁸ we have found pain to be a very prominent feature even from early in the course of the disease. Induration occurs later and fluctuation only very late.

Any large muscle group may be involved. The most common site is the thigh. When there are multiple sites they are usually in different stages of progression indicating that there is probably a primary site with other sites being secondary; however, multiple simultaneous-evolving sites are observed. The origin of the Staphylococci cannot usually be determined,^{3,5} although minor super-

ficial infection is suspected.^{4,6}

Differential diagnosis includes: osteomyelitis, sickle-cell crisis, septic arthritis, thrombophlebitis, trauma with hematoma formation, malaria, and cellulitis.

Typically, pain, fever, and swelling become more intense until the abscess is drained. In some instances, particularly in the case of secondary lesions, when antibiotic treatment is instituted early resolution may occur without incision.^{5,6} Persistent fever and pain indicate encapsulated pus and the need for drainage. Drainage results in rapid improvement.

Ideal management includes adequate drainage, culture of pus with antibiotic sensitivity analysis, and appropriate antibiotic therapy. Because of the frequency of penicillin-resistant staphylococci the use of a betalactamase-resistant penicillin is desirable, though the unavailability and high cost constitute practical problems in many medical facilities in developing countries. The importance of adequate drainage is underlined, rapid healing being as much or more related to adequate drainage as to antibiotic treatment.

Mortality should be very low. In the present series mortality was attributed to improper drainage by a village "medicinemán" in one case with complicating gas gangrene and septicemia and in the other case an anaphylactic reaction to penicillin appears to have been responsible. Metastatic infection to non-muscular tissue did not occur in this series and is reported to be extremely uncommon.^{3,4} Healing is without apparent residual.

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Minnesota Dermatological Society

Minnesota Dermatological Society, Quarterly Clinical Meeting, September 8-9, Mayo Clinic, Rochester. Program Chairman: Bruce Bart, M.D.

Legislation

Medicine, the Legislature, and You

THE 68TH MINNESOTA LEGISLATURE is now in recess after expending slightly more than half of its allotted 120 days in session. Between the first Monday in January and the 21st day of May, 201 Minnesota legislators introduced more than 5000 (including companion) bills into the Senate and the House of Representatives.

From this profusion of legislation at least 400 bills were reviewed by MSMA which dealt directly or indirectly with health or medical care. Details regarding the specific bills introduced, considered and enacted have been reported in the Minnesota State Medical Association's (MSMA) Newspaper. Only 60 of these 400 plus health related measures were signed into law during this legislative session leaving over 300 either in committee or at some other stage in the legislative process. Under the new flexible session rule provided for by the constitutional amendment passed last fall the legislature will officially reconvene on January 15, 1974 to act on these as well as other bills which will be introduced. During the interim various standing committees and their subcommittees will meet during one week of each month to hear testimony and make recommendations on many of these proposals which could be enacted into law in 1974. In addition committees will be considering new legislation which will be introduced unofficially before the session reconvenes. The advent of the flexible session rule has considerably increased the legislative workload of MSMA, which, coupled with the growing focus on health care at all levels of government, makes legislative affairs a major responsibility of the State Medical Association.

A discussion of the Association's role in the legislative process therefore seems pertinent, and to adequately meet this growing legislative challenge to medicine it is vital for more physicians to make themselves knowledgeable, interested and involved in the legislative process as it affects medicine and public health.

MSMA's legislative modus operandi is designed to permit and encourage extensive physician participation at the grass roots level. Success (or failure) of the legislative program rests to a large degree on how well individual physicians have functioned as cogs of the MSMA legislative wheel.

While the Association policy is set by the

House of Delegates and/or the Council, the Committee on Public Policy is charged with the final responsibility for implementation of the Association's legislative policy dictates. This committee is comprised of a chairman, a vice chairman and one representative from each of the nine Councilor districts. In addition there exists a Liaison Public Policy Committee of 67 members each representing one of the 67 Minnesota State Senate Districts, whose primary responsibility is to function as local contact persons for the senators and representatives in each district or to see that other physicians are enlisted for this responsibility.

MSMA's Legislative Representative and/or Legal Counsel are at the Capitol daily during the session making personal contacts and monitoring the steady flow of bills. It is virtually impossible though for them to keep in continued contact with all 201 senators and representatives on each medical issue of importance, so it is essential that there be dependable contact persons assigned to each legislator to augment MSMA staff efforts at the Capitol. Contacts are usually physicians, but in some cases doctor's wives or clinic managers also function in this capacity.

Legislative bulletins and special letters are sent to legislative contact persons at regular intervals during each session stressing communication with each legislator on those issues deemed important to medicine at that time. Special emphasis is obviously placed on contacting members of the various committees which are considering particular bills before they reach the Senate or House floor. Additional contact physicians or physicians' wives can always be utilized. Those interested in assisting the Association's legislative effort with particular legislators should contact the State Office or a member of the Public Policy Committee so they can be added to the Association's list for legislative mailings.

Every physician, whether or not an officially designated legislative contact, is urged to make it his or her responsibility to become acquainted with his senator and representative. More than ever, legislators are in need of medical input on legislation, particularly from their physician constituents. All too often legislators tell our lobbyist that they have little or no contact with the medical profession in their home district. As a

result they often lack guidance in voting on important medical issues.

Physicians may communicate with their legislators by letter, telegram or phone call but the best means of influencing legislative opinion is by a personal visit. While it is sometimes difficult to arrange a personal visit with a legislator during the session there is generally ample opportunity to do so during the interim. Such a visit may be a social affair, with or without spouse, formal or informal, breakfast, lunch, or dinner. Regardless of the format it can be an interesting, productive and rewarding experience.

Approximately one-third of this legislature are first termers who are hungry for information from professionals or interest groups in fields where they have little background or knowledge. The only physician serving in this legislature is Dr. John Salchert, a Minneapolis family physician, who is highly respected by his fellow legislators and continually sought after for advice on medical legislation. It would be extremely desirable for medicine to have more physician legislators like Dr. Salchert, however, any doctor can help influence legislative opinion by communicating personally with his or her representatives in St. Paul from time to time. Legislators respect numbers, and the more contact they have with more doctors, the better they listen.

Some county medical societies regularly invite legislators to special society legislative meetings each year, a practice which every society should include as a regular part of their society activities. Most state legislators are anxious to receive public exposure, and they are quite willing to meet with medical groups especially during election years.

Physician involvement in the legislative process must include testimony before Senate and House committees on specific medically related proposals. Frequently the nature of pending legislation is such as to require testimony from physicians

with special expertise in certain areas of medical practice. Because hearings are often scheduled on very short notice it is sometimes difficult for the Association's lobbyist to obtain appropriate testimony. Physicians who are knowledgeable and can present a comprehensive statement of pertinent facts to legislative committees in specific areas of legislative concern are encouraged to make themselves available to speak on behalf of the Association when committee testimony is required.

Most important is the need for more physician involvement in the political arena. The precursor of sound health legislation is without question a receptive and favorable climate for Association representatives to present their views. No longer should politics be considered beneath the professional dignity of the physician. Medical decisions are being made by politicians and unless physicians assist and participate in electing responsible representatives the efforts of the Public Policy Committee will bear little fruit. Though more could be written on this subject suffice it to say that the best individual physician lobbying can be done at campaign time—when the legislative candidate needs assistance. The value of a physician's support for a candidate can not be too highly stressed. Elected officials are understandably very receptive to those who stood up to be counted during the heat of a campaign.

MINNPAC has been encouraging such physician involvement in both political parties for over 10 years in Minnesota, but the membership dollars of more physicians are needed if medicine is to increase its political impact. Although the final analysis reveals many ingredients of successful medical legislative effort, campaign involvement heads the list. It is a truism that the battles fought on Capitol Hill are usually won on the campaign trails.

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Warnings: Not of value in psychotic patients. Caution against hazardous occupations requiring complete mental alertness. When used adjunctively in convulsive disorders, possibility of increase in frequency and/or severity of grand mal seizures may require increased dosage of standard anticonvulsant medication; abrupt withdrawal may be associated with temporary increase in frequency and/or severity of seizures. Advise against simultaneous ingestion of alcohol and other CNS depressants. Withdrawal symptoms (similar to those with barbiturates and alcohol) have occurred following abrupt discontinuance (convulsions, tremor, abdominal and muscle cramps, vomiting and sweating). Keep addiction-prone individuals under careful surveillance because of their predisposition to habituation and dependence. In pregnancy, lactation or women of childbearing age, weigh potential benefit against possible hazard.

Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

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Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. Caution against hazardous occupations requiring complete mental alertness (e.g., operating machinery, driving). Use in women who are or may become pregnant only when potential benefits have been weighed against possible hazards. Not recommended for use in persons under 15 years of age. Though physical and psychological dependence have not been reported on recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage.

Precautions: In elderly and debilitated, initial dosage should be limited to 15 mg to preclude oversedation, dizziness and/or ataxia. If combined with other drugs having hypnotic or CNS-depressant effects, consider potential additive effects. Employ usual precautions in patients who are severely depressed, or with latent depression or suicidal tendencies. Periodic blood counts and liver and kidney function tests are advised during repeated therapy. Observe usual precautions in presence of impaired renal or hepatic function.

Adverse Reactions: Dizziness, drowsiness, lightheadedness, staggering, ataxia and falling have occurred, particularly in elderly or debilitated patients. Severe sedation, lethargy, disorientation and coma, probably indicative of drug intolerance or overdosage, have been reported. Also reported were headache, heartburn, upset stomach, nausea, vomiting, diarrhea, constipation, GI pain, nervousness, talkativeness, apprehension, irritability, weakness, palpitations, chest pains, body and joint pains and GU complaints. There have also been rare occurrences of sweating, flushes, difficulty in focusing, blurred vision, burning eyes, faintness, hypotension, shortness of breath, pruritus, skin rash, dry mouth, bitter taste, excessive salivation, anorexia, euphoria, depression, slurred speech, confusion, restlessness, hallucinations, and elevated SGOT, SGPT, total and direct bilirubins and alkaline phosphatase. Paradoxical reactions, e.g., excitement, stimulation and hyperactivity, have also been reported in rare instances.

Dosage: Individualize for maximum beneficial effect. *Adults:* 30 mg usual dosage. 15 mg may suffice in some patients. *Elderly or debilitated patients:* 15 mg initially until response is determined.

Supplied: Capsules containing 15 mg or 30 mg flurazepam HCl.



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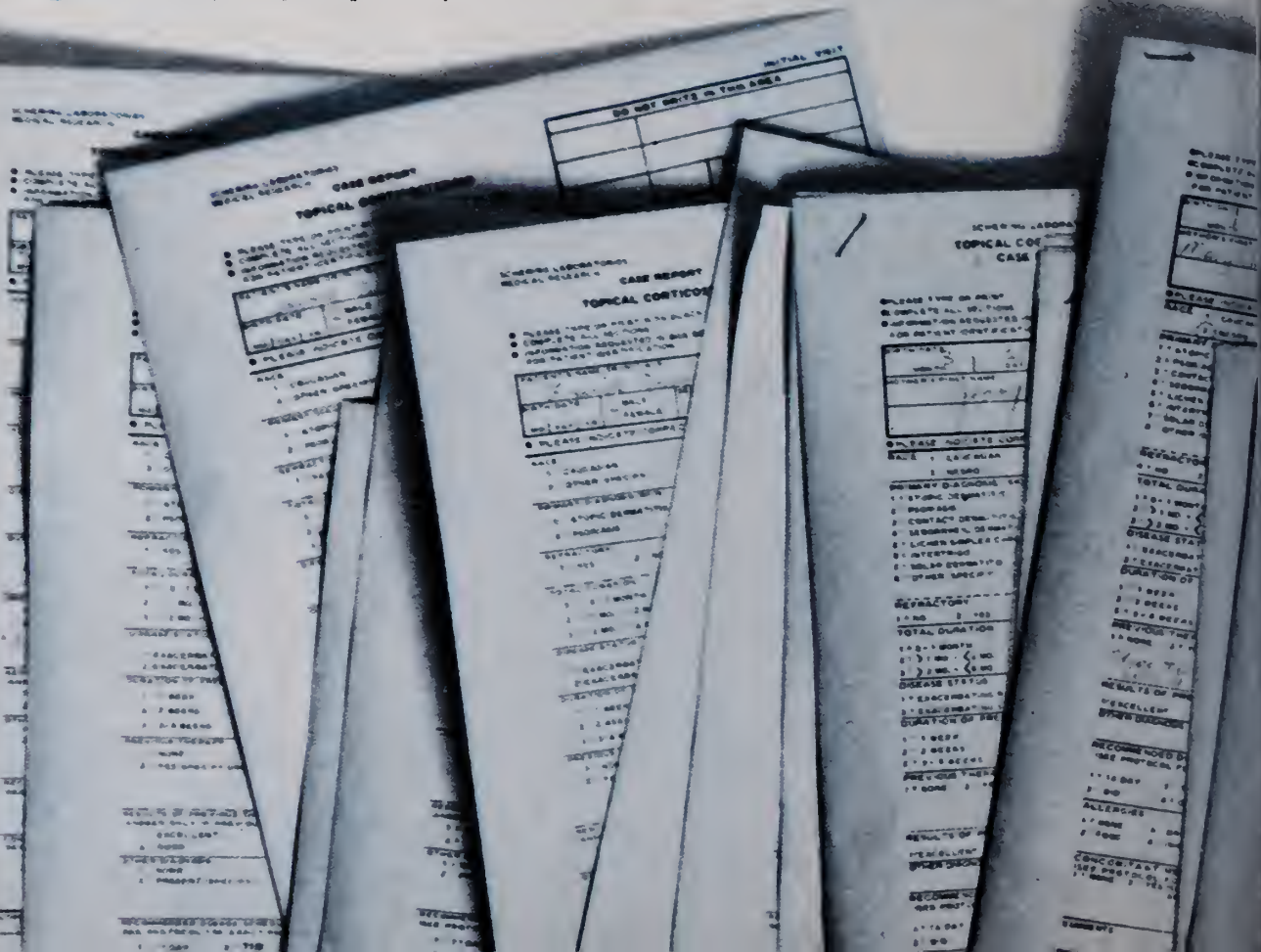
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92% in atopic eczema
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CLINICAL CONSIDERATIONS:

Description VALISONE products contain betamethasone valerate (9-fluoro-11 β ,17,21-trihydroxy-16 β -methylpregna-1,4-diene-3,20-dione 17-valerate). Each gram of VALISONE Cream 0.1% contains 1.2 mg. betamethasone valerate (equivalent to 1.0 mg. betamethasone) in a soft, white, hydrophilic cream of water, mineral oil, petrolatum, polyethylene glycol 1000 monooctyl ether, cetostearyl alcohol, monobasic sodium phosphate, and phosphoric acid; 4-chloro-m-cresol is present as a preservative. Each gram of VALISONE Ointment 0.1% contains 1.2 mg. betamethasone valerate (equivalent to 1.0 mg. betamethasone) in an ointment base of liquid and white petrolatum, and hydrogenated lanolin. VALISONE Cream and Ointment contain no parabens.

Indications VALISONE Cream and Ointment are indicated for the relief of the inflammatory manifestations of corticosteroid-responsive dermatoses.

Contraindications VALISONE Cream and Ointment are contraindicated in vaccinia and varicella. Topical steroids are contraindicated in those patients with a history of hypersensitivity to any of the components of the preparation.

Precautions If irritation develops with the use of VALISONE Cream or Ointment, treatment should be discontinued and appropriate therapy instituted. In the presence of an infection, the use of an appropriate antifungal or antibacterial agent should be instituted. If a favorable response does not occur promptly, the corticosteroid should be discontinued until the infection has been adequately controlled. If extensive areas are treated or if the occlusive technique is used, the possibility exists of increased systemic absorption of the corticosteroid and suitable precautions should be taken. Although topical steroids have not been reported to have an adverse effect on pregnancy, the safety of their use in pregnant females has not been absolutely established. Therefore, they should not be used extensively in pregnant patients, in large amounts, or for prolonged periods of time. VALISONE Cream and Ointment are not for ophthalmic use.

Adverse Reactions The following local adverse reactions have been reported with topical corticosteroids: burning, itching, irritation, dryness, folliculitis, hypertrichosis, acneiform eruptions, and hypopigmentation. The following may occur more frequently with occlusive dressings than without such therapy: maceration of the skin, secondary infection, skin atrophy, striae, and miliaria.

Dosage and Administration Apply a thin film of VALISONE Cream or Ointment to the affected skin areas one to three times a day. Clinical studies of VALISONE have indicated that dosage only once or twice a day is often feasible and effective. AUGUST 1972
For more complete details, consult Schering literature available from your Schering Representative or Professional Services Department, Schering Corporation, Kenilworth, New Jersey 07033.

References: (1) Files of Headquarters Medical Research Division, Schering Corporation. (2) Carter, V. H., and Noojin, R. O.: Curr. Therap. Res. 9:253, 1967. (3) Falk, M. S.: Cutis 2:788, 1966. (4) Goldblum, R. W.: Pennsylvania Med. 69:50, 1966. (5) Nierman, M. M.: J. Indiana M. A. 10:1184, 1966. (6) Zimmerman, E. H.: Arch. Dermat. 95:514, 1967.

Two overlapping Schering Laboratories Topical Corticosteroid Case Report forms are shown. The forms contain fields for patient information, clinical history, and evaluation of response to treatment. The top form is partially filled out with handwritten notes and dates.

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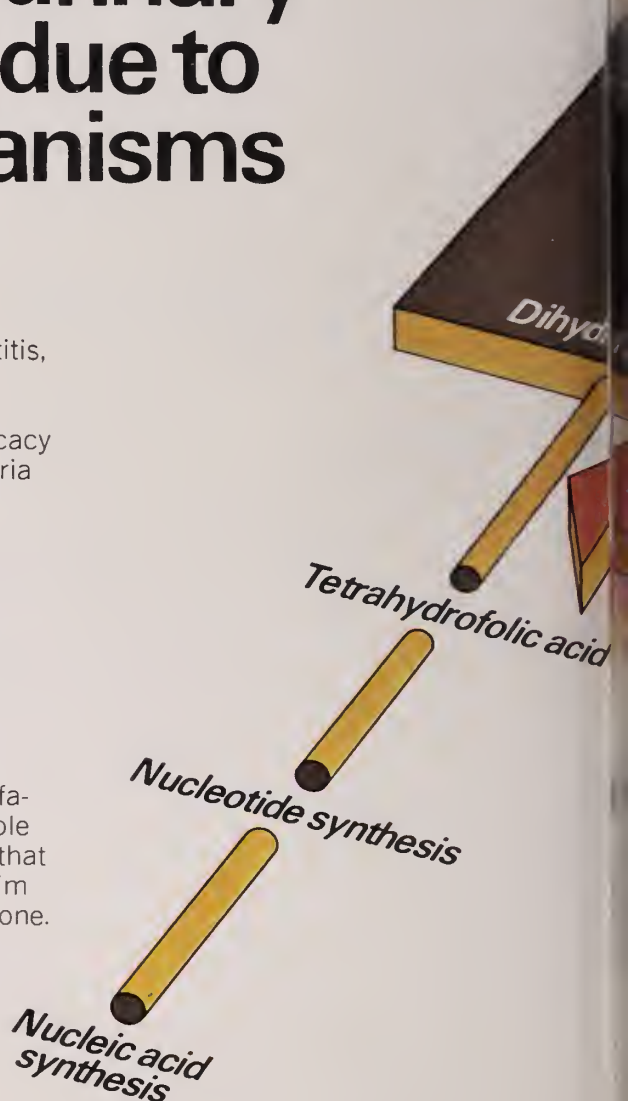
Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

a new type of antibacterial for a two-pronged attack against chronic urinary tract infections due to susceptible organisms

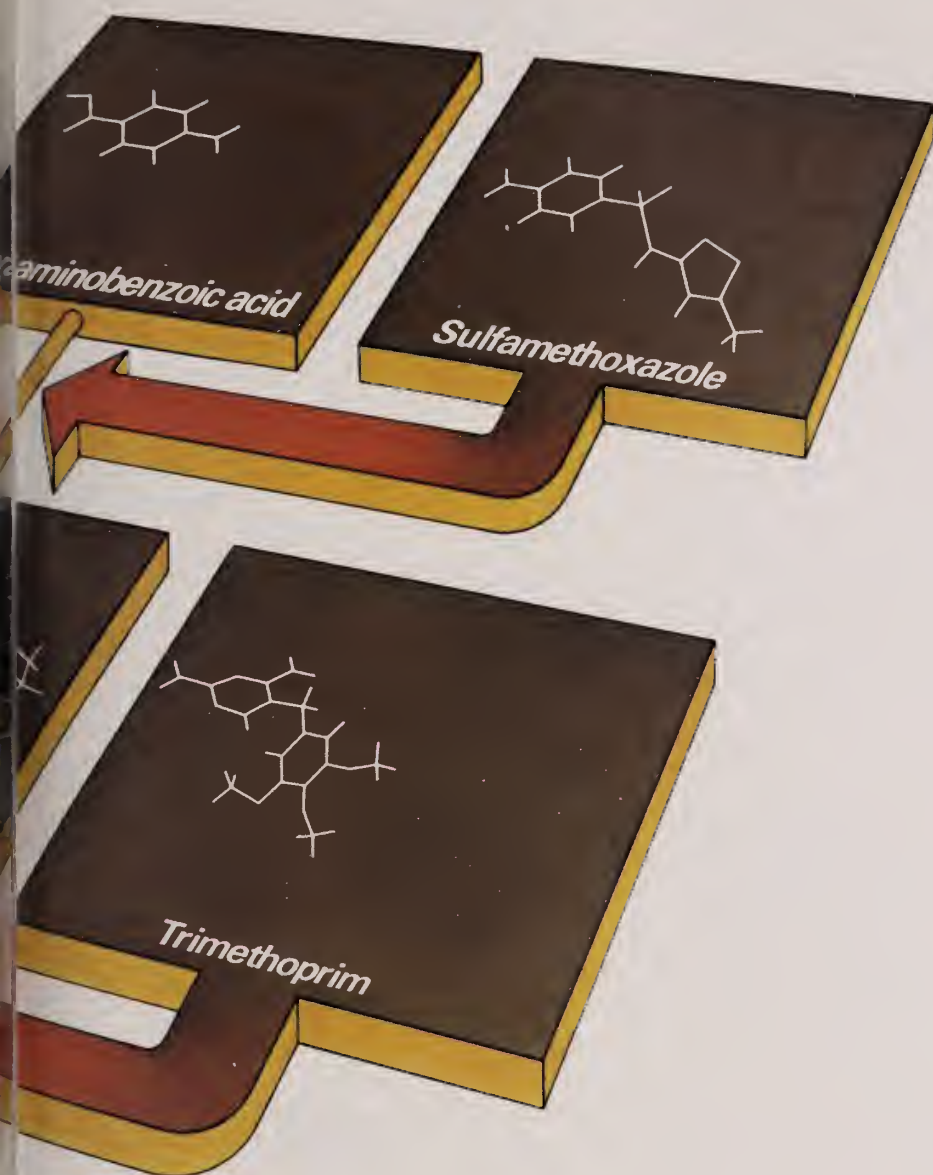
Bactrim is highly effective in the treatment of these infections – primarily pyelonephritis, pyelitis and cystitis, when due to susceptible organisms (usually *E. coli*, *Klebsiella-Enterobacter*, *Proteus mirabilis*, and, less frequently, indole-positive proteus species). This efficacy is related to the unique mode of action against bacteria (see opposite page), an action that, in effect, makes Bactrim a new type of antibacterial.

Bactrim significantly superior to constituents in patients with obstructive complications

In the presence of obstructive uropathy, Bactrim has demonstrated efficacy which is superior to either sulfamethoxazole or trimethoprim alone against susceptible organisms. In addition, *in vitro** studies have shown that bacterial resistance develops more slowly with Bactrim than with either trimethoprim or sulfamethoxazole alone.



*Please note that clinical conclusions cannot be extrapolated from *in vitro* studies.



Interrupts life cycle of susceptible bacteria

The mode of action interrupts the life cycle at two important points, thereby impeding the production of nucleic acids and proteins essential to these bacteria. These consecutive interruptions occur because sulfamethoxazole and trimethoprim resemble naturally existing substrates. By competitive replacement of these substrates, they inhibit further synthesis.

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for chronic urinary tract infections

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Excellent clinical response in chronic urinary tract infections

A multiclinic, double-blind study* of response to a ten-day course of therapy in 471† patients with chronic urinary tract infections demonstrated the superiority of Bactrim. On the 10th day after initiation of therapy, 91.7% (of 168 patients) showed significant bacteriological response to Bactrim compared with 81.2% (of 144 patients) to trimethoprim and 64.5% (of 155 patients) to sulfamethoxazole. In patients with obstructive complications, 10th day response was 94.8% (of 97 patients) to Bactrim, 72.9% (of 85 patients) to trimethoprim and 58.5% (of 94 patients) to sulfamethoxazole.

Excellent response maintained

Bactrim proved equally impressive in maintaining this bacteriological response. In the above study, after ten-day therapy with Bactrim, 68.4% of patients with chronic urinary tract infections maintained response for up to 42 consecutive days, compared with 59.7% with trimethoprim and 44.4% with sulfamethoxazole. In patients with obstruction, 70.8% of those on Bactrim maintained response for up to 42 consecutive days, compared

with 49.4% on trimethoprim and 38.8% on sulfamethoxazole. The figures are particularly remarkable in cases with urinary obstruction—cases regarded as being notoriously difficult to treat.

To date, low incidence of significant side effects

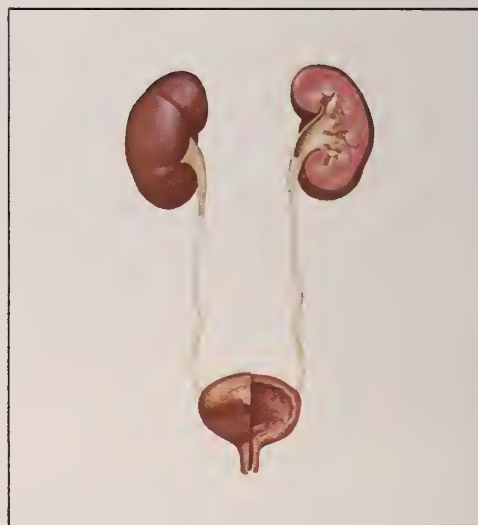
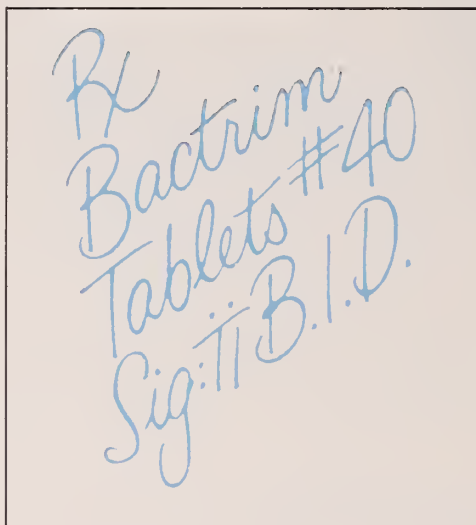
Although Bactrim demonstrated impressive results, it is important to note that the incidence of clinically significant adverse effects was low, including nausea and/or vomiting, rash, leukopenia, SGPT increase and creatinine increase.

Bactrim should be given with caution to patients with impaired renal or hepatic function, possible folate deficiency and to those with severe allergic bronchial asthma. Adequate fluid intake must be maintained. Complete blood counts, urinalysis, careful microscopic examination, and renal function tests should be performed during therapy.

Currently, the increasing frequency of resistant organisms is a limitation of the usefulness of all antibacterial agents, especially in the treatment of chronic and recurrent urinary tract infections.

Usual adult dosage: two tablets every twelve hours for 10 to 14 days; no loading dose required.

* Data on file, Hoffmann-La Roche Inc., Nutley, N.J. 07110.
† 4 patients not available for evaluation at day 10.



new **BACTRIM**TM

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for chronic urinary tract infections



Roche Laboratories
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Before prescribing, please consult complete product information on facing page.

Product Information:

Indication: Bactrim is a synthetic antibacterial combination product consisting of two active ingredients: trimethoprim and sulfamethoxazole. Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

Chemical Structure: Trimethoprim is 2,4-diamino-5-(3,4,5-trimethoxybenzyl) pyrimidine. Sulfamethoxazole is a white to light-yellow, odorless, bitter compound with a molecular weight of 290.3.

Pharmacology: Sulfamethoxazole is *N*-(5-methyl-3-isoxazolyl)sulfanilamide. It is a white to light-yellow, odorless, tasteless compound with a molecular weight of 253.28.

Microbiology: Sulfamethoxazole inhibits bacterial synthesis of folic acid by competing with para-aminobenzoic acid. Trimethoprim blocks the production of tetrahydrofolic acid from dihydrofolic acid by binding to and reversibly inhibiting the required dihydrofolate reductase. Thus, Bactrim blocks two consecutive steps in the biosynthesis of nucleic acids and proteins in many bacteria.

Resistance: Studies have shown that bacterial resistance develops more rapidly with Bactrim than with trimethoprim or sulfamethoxazole alone.

Sensitivity: Serial dilution tests have shown that the spectrum of antibacterial activity of Bactrim includes the common urinary tract pathogens with the exception of *Pseudomonas aeruginosa*. The following organisms are usually susceptible: *Escherichia coli*, *Klebsiella aerobacter*, *Proteus mirabilis* and indole-positive proteus.

Representative Minimum Inhibitory Concentration Values for Bactrim-Susceptible Organisms (MIC—mcg/ml)

	Trimethoprim alone	Sulfamethoxazole alone	TMP/SMX (1:20)	
			TMP	SMX
<i>Shigella</i>	0.05—1.5	1.0 —245	0.05—0.5	0.95— 9.5
<i>S. dysenteriae</i> (Sdp. positive)	0.5 —5.0	7.35 —300	0.05—1.5	0.95—28.5
<i>Shigella flexneri</i>	0.5 —1.5	7.35 — 30	0.05—0.15	0.95— 2.85
<i>Shigella sonnei</i>	0.15—5.0	0.735—245	0.05—1.5	0.95—28.5

Pharmacokinetics: Bactrim is rapidly absorbed following oral administration. The blood levels of trimethoprim and sulfamethoxazole are similar to those achieved when each component is given alone. Peak blood levels for the individual components occur one hour after oral administration. The half-lives of sulfamethoxazole and trimethoprim, 10 and 16 hours respectively, are relatively constant regardless of whether these compounds are administered as individual components or as Bactrim. Detectable levels of trimethoprim and sulfamethoxazole are present in the blood 2 hours after drug administration. Free sulfamethoxazole and trimethoprim blood levels are proportionately dose-dependent. Following administration, the steady-state ratio of trimethoprim to sulfamethoxazole levels in the blood is about 1:20.

Metabolism: Sulfamethoxazole exists in the blood as free, conjugated and protein-bound forms; trimethoprim is present as free, protein-bound and metabolized forms. The free forms are considered to be the pharmacologically active forms. Approximately 44 percent of trimethoprim and 70 percent of sulfamethoxazole are protein-bound in the blood. The presence of 10 mg percent sulfamethoxazole in plasma does not influence the protein binding of trimethoprim. The protein binding of trimethoprim does not influence the protein binding of sulfamethoxazole.

Excretion: Bactrim is chiefly excreted by the kidneys through both glomerular filtration and tubular secretion. Urine concentrations of both sulfamethoxazole and trimethoprim are considerably higher than plasma concentrations in the blood. When administered together as Bactrim, neither sulfamethoxazole nor trimethoprim affects the urinary excretion pattern of the other.

Indications: Chronic urinary tract infections (primarily pyelonephritis and cystitis) due to susceptible organisms (usually *Escherichia coli*, *Klebsiella aerobacter*, *Proteus mirabilis*, and, less frequently, indole-positive proteus species).

Contraindications: Currently, the increasing frequency of resistant organisms limits the usefulness of all antibacterial agents, especially the treatment of chronic and recurrent urinary tract infections.

Warnings: Hypersensitivity to trimethoprim or sulfonamides. Anemia and during the nursing period (see Reproduction section).

Deaths: Deaths associated with the administration of sulfonamides have been reported from hypersensitivity reactions, agranulocytosis, aplastic anemia and other blood dyscrasias. Experience with trimethoprim alone is much more limited, but it has been reported to be associated with hematopoiesis in occasional patients. In elderly patients concurrently receiving certain diuretics, primarily thiazides, an increased incidence of thrombopenia with purpura has been reported.

The presence of clinical signs such as sore throat, fever, pallor, purpura or jaundice may be early indications of serious blood disorders. Complete blood counts should be done frequently in patients receiving Bactrim. If a significant reduction in the count of any formed blood element is noted, Bactrim should be discontinued.

At the present time, there is insufficient clinical information on the use of Bactrim in infants and children under 12 years of age to recommend its use.

Precautions: Bactrim should be given with caution to patients with impaired renal or hepatic function, to those with possible folate deficiency and to those with severe allergy or bronchial asthma. In glucose-6-phosphate dehydrogenase-deficient individuals, hemolysis may occur. This reaction is frequently dose-related. Adequate fluid intake must be maintained in order to prevent crystalluria and stone formation. Urinalyses with careful microscopic examination and renal function tests should be performed during therapy, particularly for those patients with impaired renal function.

Adverse Reactions: For completeness, all major reactions to sulfonamides and to trimethoprim are included below, even though they may not have been reported with Bactrim.

Blood dyscrasias: Agranulocytosis, aplastic anemia, megaloblastic anemia, thrombopenia, leukopenia, hemolytic anemia, purpura, hypoprothrombinemia and methemoglobinemia.

Allergic reactions: Erythema multiforme, Stevens-Johnson syndrome, generalized skin eruptions, epidermal necrolysis, urticaria, serum sickness, pruritus, exfoliative dermatitis, anaphylactoid reactions, periorbital edema, conjunctival and scleral injection, photosensitization, arthralgia and allergic myocarditis.

Gastrointestinal reactions: Glossitis, stomatitis, nausea, emesis, abdominal pains, hepatitis, diarrhea and pancreatitis.

C.N.S. reactions: Headache, peripheral neuritis, mental depression, convulsions, ataxia, hallucinations, tinnitus, vertigo, insomnia, apathy, fatigue, muscle weakness and nervousness.

Miscellaneous reactions: Drug fever, chills, and toxic nephrosis with oliguria and anuria. Periarthritis nodosa and L. E. phenomenon have occurred.

The sulfonamides bear certain chemical similarities to some goitrogens, diuretics (acetazolamide and the thiazides) and oral hypoglycemic agents. Goiter production, diuresis and hypoglycemia have occurred rarely in patients receiving sulfonamides. Cross-sensitivity may exist with these agents. Rats appear to be especially susceptible to the goitrogenic effects of sulfonamides, and long-term administration has produced thyroid malignancies in the species.

Dosage and Administration: Not recommended for use in children under 12 years of age.

The usual adult dosage is two tablets every 12 hours for 10 to 14 days.

For patients with renal impairment:

Creatinine Clearance (ml/min)	Recommended Dosage Regimen
Above 30	Usual standard regimen
15-30	2 tablets every 24 hours
Below 15	Use not recommended

How Supplied: Tablets, containing 80 mg trimethoprim and 400 mg sulfamethoxazole—bottles of 100 and 500; Tel-E-Dose® packages of 1000; Prescription Paks of 40, available singly and in trays of 10. Imprint on tablets: ROCHE 50.

Reproduction Studies: In rats, doses of 533 mg/kg sulfamethoxazole or 200 mg/kg trimethoprim produced teratological effects manifested mainly as cleft palates. The highest dose which did not cause cleft palates in rats was 512 mg/kg sulfamethoxazole or 192 mg/kg trimethoprim when administered separately. In two studies in rats, no teratology was observed when 512 mg/kg of sulfamethoxazole was used in combination with 128 mg/kg of trimethoprim. However, in one study, cleft palates were observed in one litter out of 9 when 355 mg/kg of sulfamethoxazole was used in combination with 88 mg/kg of trimethoprim.

In rabbits, trimethoprim administered by intubation from days 8 to 16 of pregnancy at dosages up to 500 mg/kg resulted in higher incidences of dead and resorbed fetuses, particularly at 500 mg/kg. However, there were no significant drug-related teratological effects.

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President's Letter

Association of Minnesota Internists

The Association of Minnesota Internists is a component society of the American Society of Internal Medicine, established in 1958 and consisting of specialists in Internal Medicine, Board Certified or Qualified. The national organization, comprising approximately 12,000 members, was originated, and has continued, to provide a forum for education and action by Internists relating to the social, economic, and political forces bearing on medical care. The practical aspects of insuring and monitoring the quality of care and methods of dispensing that care have been of special interest in recent years.

The Association of Minnesota Internists meets frequently through its Executive Committee and meets two to four times annually in general session. Educational meetings have related to numerous items of interest to Internists, from the impact of computerized histories to talks with political figures including Senator Humphrey, Representative Frenzel, and others. The most recent meeting presented a group discussion of prepaid medical health care practices, including representatives from Group Health, the Nicollet Clinic, the St. Louis Park Clinic, Minnesota Blue Cross/Blue Shield, and the Twin City Health Care Development Project. Other meetings have included exchanges of views between practicing Internists and Blue Shield carriers or the Health Care Foundation; others have dealt with internal comparisons of Internists' practices, including an excellent talk by Mr. Millard Mills of Professional Management Midwest. Varying views of members have been heard, discussed, and acted upon with resolutions submitted to our national organization at annual meetings. The Minnesota State Medical Association has recently acted favorably upon a resolution from the Association of Minnesota Internists dealing with assuring the quality of care in various health care delivery programs.

The Association of Minnesota Internists, through its Executive Committee, serves as the representative of its membership in dealing with outside forces in Internal Medicine. Recent issues have included the Foundation for Health Care Evaluation, Minnesota State Legislative Session, the Cancer Detection Center at the University of

Minnesota, the Educational Committee of the Minnesota State Medical Association dealing with recertification procedures, and the Relative Value Sub-Committee of the State Medical Association. Current topics include the PSRO developments in the State, and on-going evaluation of HMO projects.

The officers and Executive Committee of the Minnesota Internists represent physicians from numerous groups and varying viewpoints, having included those from solo and small group private practices, small and large clinics, insurance companies, full-time teachers, and part-time employees of governmental bodies. Hopefully, it is possible that the items dealt upon at meetings have a far wider impact because of the diversity of membership.

Representatives are present at the American Society of Internal Medicine meetings as voting delegates in the spring, at the annual meetings, and at the interim fall meeting, also as an educational project. This year's annual meeting in Chicago related to PSROs with Senator Bennett; Dr. Edwards, the Assistant Secretary of Health in HEW; Dr. Schumacher, Interim Chief of the PSRO, and others as participants. Last year's meeting related to national health insurance with Representative Wilbur Mills, AFL/CIO President Leonard Woodcock, and others. The national organization is also engaged in continuing dialogue with governmental forces and has supplied counsel and help to these, the current Director of PSRO, Dr. Bauer, being a member of the Colorado component and a current governmental contract relating to methods of evaluation of quality of care being two examples. The American Society of Internal Medicine has also intervened with governmental forces when necessary, such as the recent problem relating to pre-admission certification which was to have been brought into effect soon.

The Association of Minnesota Internists welcomes to membership all qualified Internists who are interested in participating in the social and economic aspects of providing quality care to our patients.

WILLIAM J. PAULE, M.D., President
Association of Minnesota Internists

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A Phenylketonuric with Superior Intelligence

ROBERT O. FISCH, M.D.,* and PI-NIAN CHANG, M.A.†

THIS REPORT IS to present the case of a phenylketonuric with superior intelligence who has been treated since his early infancy.

Case Report

The patient, a white male infant, was born on September 29, 1968, following an uncomplicated 40-week gestational period. Labor, delivery, and the neonatal course were uneventful. His birthweight was 3628 gm and his length 49.5 cm. He was breastfed. According to the Guthrie Test done on the fourth day of life, his serum-phenylalanine concentration was over 20 mg/100 ml. Repeated tests revealed serum-phenylalanine concentrations between 50 and 55 mg/100 ml, serum-tyrosine concentrations less than 3 mg/100 ml, and the presence of phenylketones and orthohydroxyphenylacetic acid in the urine.

At 26 days of age the child was referred to the Phenylketonuric Clinic at the University of Minnesota Hospitals. A physical examination of the infant revealed blue eyes, blondish hair, a body length of 54.5 cm (45th percentile), a body weight of 4300 gm (40th percentile), and an occipitofrontal circumference of 36.5 cm (50th percentile). According to the laboratory tests, his serum-phenylalanine concentration was 30.4 mg/100 ml and his serum tyrosine concentration less than 3 mg/100 ml. The urine contained phenylpyruvic acid (0.44 micromole/l ml), phenylacetic acid (0.04 micromole/l ml), and orthohydroxyphenylacetic acid (0.04 micromole/l ml). Phenylketonuria was diagnosed and the infant placed on a restricted phenylalanine diet (Lofenalac) beginning October 25, 1968.

Treatment and Outcome

The dietary treatment consisted in variable restrictions of the patient's daily phenylalanine and protein intake. These restrictions, as well as the resultant serum-phenylalanine concentrations are tabulated in the Table for each year of the patient's life.

The patient's growth has been satisfactory since his first visit to our clinic at almost four weeks of age. His most recent weight (at four years, four months) was 19.6 kg (80th percentile), his height 103.6 cm (50th percentile), and his occipitofrontal circumference 51.5 cm (50th percentile). His electroencephalographic records have been

Age	Dietary Management		Laboratory Values	
	Phenylalanine Mg/kg of body weight/day	Protein Gm/kg of body weight/ day	Serum Phenylalanine (Mg 100 ml) Range	Mean
1st Year	50-30	3.8-2.5	1-15	7
2nd Year	30-21.6	3.2-2.6	3.3-19.2	12.4
3rd Year	24.3-18.8	2.4-2	6.4-16	12.7
4th Year	20.8-18.4	2.4-2	9.5-13.1	11.4
Current	18	1.9	13.3	

normal or only slightly abnormal. His bone age has been continually normal for his chronological age. He could sit up alone at five and a half months of age and walk unaided at 11 months of age. He started verbalizing at 13 months of age.

Psychological evaluations have been done annually during the past four and a half years. At seven months of age, he obtained a mental development quotient of 107 on the Bayley Scales of Infant Development; at one and a half years of age, an IQ score of 103 on the Cattell Infant Intelligence Scale, and a SQ score of 122 on the Vineland Social Maturity Scale; at two and a half years of age, an IQ score of 123 on the Stanford Binet Intelligence Scale, Form L-M; and at three years and four months of age, an IQ score of 127 on the Stanford-Binet Intelligence Scale, Form L-M. The most recent psychological evaluation was done in January, 1973. At four years and four months of age, he obtained an IQ score of 142 on the Stanford-Binet Intelligence Scale, Form L-M. His language development, both expressive and comprehensive, appeared very advanced. He used words and sentences at the level of a six-year-old. He even scored on two items, verbal similarities and verbal comprehension, at the seven-year level. His perceptual motor performances, such as maze tracing and identifying missing parts of pictorial objects, were at the six-year level. He obtained these high scores even though his behavior seemed rather restless and fidgety and he found it somewhat difficult to accommodate to external demands.

His home environment is favorable. At the time of his birth, both his parents were 31 years old. The mother had a master's degree in education and was employed. Since intellectual pursuits and achievements are important to her, she started teaching her son how to read, spell, and count before he was two years of age. According to the Wechsler Adult Intelligence Scale, she falls within the superior range of intelligence with a full-scale IQ of 126. The father had a doctor of philosophy degree and was teaching at a college. According to the

*Associate Professor, Department of Pediatrics, University of Minnesota.

†Research Fellow, Department of Pediatrics, University of Minnesota.

Address for Reprints: Robert O. Fisch M.D., Box 384, Mayo Memorial Hospital, University of Minnesota, Minneapolis, Minnesota 55455.

Wechsler Adult Intelligence Scale, he falls within the superior range of intelligence with a full-scale IQ of 148. Upon learning that their child was phenylketonuric, the couple decided to have no more children, and the wife has not been pregnant since.

Discussion

This patient is a highly intelligent phenylketonuric who has been treated since early infancy. In the last fifteen years we have treated 101 phenylketonuric children at our clinic. Among these 101 children, there were only 21 whose treatment was begun at less than one month of age. All 21 were evaluated psychologically on the basis of tests given to them annually by the same psychologist. Among these 21 treated children, five have IQs between 100 and 110, and two have IQs above 110 but not exceeding 116. Only this one patient has an IQ above 120.

The outcome of phenylketonuria prior to the dietary treatment was unfavorable, and most phenylketonurics had IQs under 60.^{1,2} During this period few phenylketonurics were reported to have even average intelligence.² Since the institution of the dietary treatment the mental development of phenylketonurics treated early in life has been much better. Recent reports cite numerous phenylketonurics with average intelligence.³⁻⁵ In spite of dietary treatment, most phenylketonurics have been found to perform on psychological tests at a lower level than their unaffected siblings.⁶ There is both theoretical and clinical evidence⁷⁻⁸ suggesting that the phenylketonuric may be damaged *intra utero*, so that his dietary treatment following birth can be only partially successful. A few phenylketonurics treated early in life have performed on psychological tests as well as their unaffected siblings⁵; and one report assumes that phenylketonurics treated early in life may perform better on psychological tests than their unaffected siblings or even their parents.⁹ This assumption, resulting from a study of selected families, remains an unwarranted generalization, and it is questionable in any case whether a serious metabolic disorder like phenylketonuria can ever

be mentally advantageous to its possessor. A few reports dealing with the outcome of both treated and untreated phenylketonurics indicate that a few of them possess higher than average intelligence. These reports fail to mention the ages of the phenylketonurics at the time of the psychological tests and they cite intelligence quotients that include development quotients.^{2,10,11} None of them describes in detail a child with superior intelligence.

As far as we know, our patient is the only phenylketonuric with at least superior intelligence who has been described in detail. The successful outcome of this patient is possibly connected with one or more of the following four factors: (1) The diagnosis was made and the treatment started at an early age. (2) His dietary intake, which has not been severely restricted according to his serum phenylalanine levels, has allowed for a normal growth and more than expected weight gain. (3) His intellectual and social environment difference has been favorable. And (4) there may exist a biochemical enzymatic difference between him and other phenylketonurics. (This assumption, however, is supported neither by the results of blood tests and urinalysis prior to the diet nor by differences in his response to dietary restriction.)

Interestingly, while other phenylketonurics at best maintain their IQs on a certain level, this patient's IQ has been increasing from year to year. One possible explanation for his increasing IQ is that the more advanced tests given to him at a later age allowed for more precise evaluations of his verbal development.

Although it is impossible to generalize from merely one example, it is evident that the dietary treatment of this phenylketonuric patient under favorable circumstances has not been incompatible with the development of superior intelligence. The outcome of this phenylketonuric patient marks an important stage in increasingly successful dietary treatment.

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- 9-11. will be found on page 752.

Pneumoretroperitoneum, Pneumomediastinum, and Subcutaneous Emphysema

Complications of Acute, Perforated Diverticulitis

JUAN SUROS, M.D.* and RAYMOND A. LEE, M.D.*

AT LEAST ONE of every four patients with diverticulitis of the colon has a major complication, resulting in an indication for surgery—perforation is responsible for approximately one third of these complications.¹ Typically, the perforation results in a localized pericolic abscess or a fistula, and when the septic process surrounding the perforation is no longer contained, in generalized peritonitis²⁻⁴ with or without pneumoperitoneum. Extraperitoneal perforation of diverticulitis is extremely rare,⁵ and the extension of the intraluminal colonic gas beyond the abdominal area can mimic the most unexpected pathologic condition. Because this complication may occur without a previous history of diverticular disease and may be difficult to relate at first with its primary source, the diagnosis is difficult.

Recently, we have encountered two patients with pneumoretroperitoneum, pneumomediastinum, and subcutaneous emphysema of flank, chest, and neck as a complication of extraperitoneal perforation of acute diverticulitis among a larger number of more common free and local perforations. This experience points once again to the need to be aware of the many manifestations of diverticular disease of the colon and its bizarre complications.

Case Reports

Case 1

An 80-year-old woman fell three years before the present admission and suffered an intertrochanteric fracture of her left hip. Treatment was not successful, and the fracture did not unite. Previously, she had had diverticulosis of the sigmoid colon.

On March 29, 1971, she underwent left total hip

arthroplasty. She did well for the first three postoperative days, and oral feeding was started, but on April 2, she became nauseated, refused to eat because of abdominal pain, and vomited a few times. Physical examination revealed a temperature of 37.8 C (100 F), diminished bowel sounds, and minimal tenderness in the lower abdomen. No masses were felt.

Laboratory studies revealed a leukocyte count of 13,500/cu mm. Values for serum electrolytes and hematocrit and findings on a portable flat abdominal roentgenogram were normal. Conservative treatment with intravenous fluids, intubation, and intravenous antibiotics was started.

On the next day, the abdominal pain and tenderness became more severe and became localized to the left lower abdominal quadrant. In the afternoon of this same day, crepitus was noticed in the neck and supraclavicular regions. Auscultation of the heart also revealed crepitant sounds synchronous with the heart beat. A roentgenographic study confirmed subcutaneous emphysema in the neck, supraclavicular regions, and abdomen, with pneumomediastinum and elevation of the right hemidiaphragm due to free air under it. Several loops of small bowel appeared distended, suggesting mechanical bowel obstruction. A study with contrast medium (gastrographin) revealed that the esophagus was well opacified and normal. The combination of obstruction, free air in the peritoneal cavity, and spreading subcutaneous emphysema, coupled to the clinical symptoms of lower abdominal pain and knowledge of previously proved diverticulosis, made the diagnosis of acute perforated diverticulitis most likely.

When the abdominal cavity was entered, air that was under pressure came out spontaneously. The sigmoid colon was inflamed, indurated, edematous, and attached to an area immediately lateral to the left psoas muscle, where there were signs of a recent extraperitoneal hematoma. At least two small diverticular perforations could be identified. Crepitation could be manually felt along the left psoas muscle and retroperitoneum as high up as the diaphragm. The rest of the colon was normal; its transverse portion was divided and a double-barrel colostomy was established. The left paracolic gutter was drained. The patient became afebrile and recovered

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See editorial, page 772.

without complications. Six months later, left hemicolectomy and coloproctostomy were performed.

Case 2

A 63-year-old man was referred to our clinic on June 25, 1971, because of persistent abdominal symptoms, fever, and shortness of breath. His present condition started 12 days before as acute nephrolithiasis. While receiving an enema in preparation for an excretory urogram, he suddenly experienced severe left lower quadrant abdominal pain, which persisted unchanged during the days that followed. Because there was no response to conservative management and the presence of progressive abdominal distension and rigidity, persistent fever, long history of pulmonary emphysema, and the worrisome appearance of subcutaneous crepitations, he was transferred.

On admission, he was in respiratory distress, and complained of nausea, vomiting, and abdominal discomfort. His temperature was 38.9 C (102 F). Physical examination revealed crepitations over the left flank, left chest wall, both supraclavicular fossae, and neck bilaterally. The abdomen was distended and tender, with some rigidity.

Laboratory studies revealed a leukocyte count of 17,450/cu mm, with a shift to the left. Arterial blood gases showed a P_{O_2} of 48 mm Hg and a P_{CO_2} of 63 mm Hg. Oxygen was given through a nasal cannula (5 L/min), and intermittent positive-pressure breathing, complemented by chest physiotherapy, was begun. Blood and sputum cultures were obtained. Roentgenographic studies confirmed the subcutaneous emphysema and free air in the abdominal cavity. Study of films that the patient brought with him revealed that the free extraperitoneal air had progressed along the left psoas border, left abdominal wall, and left chest wall from June 14 to June 24. A proctoscopic examination revealed that the mucosa was normal up to 21 cm and no angulation was seen.

Conservative treatment was continued, with intravenous fluids, intravenous antibiotics, and intubation, because the urgent problem seemed to be respiratory insufficiency. The patient was observed closely by medical and surgical services, and blood was kept available at all times.

The following day, he improved, being less febrile and short of breath. Two days later, he started to pass gas per rectum and the subcutaneous emphysema seemed to decrease. His abdominal distension and tenderness also diminished. Study after a barium enema on June 28 showed colonic diverticulitis, with perforation of the proximal sigmoid, and an abscess cavity dissecting along the left psoas muscle and extending up as high as the left kidney.

At surgery, during mobilization of the descending colon, on July 2 an abscess containing about 15 ml of purulent material was found lateral to the psoas muscle. A sigmoidectomy and coloproctostomy were performed, and the left paracolic gutter was irrigated with an 0.5% neomycin solution and drained. The patient remained afebrile, had a smooth recovery, and was dismissed on the 12th postoperative day. Pathologic examination of the resected specimen showed acute diverticu-

litis with at least two areas of perforation.

Comment

Sigmoid diverticulitis is the most common inflammatory disease of the colon. Each of our patients had been previously asymptomatic, and the coincidence of diverticular inflammation and extraperitoneal perforation after mechanical trauma (previous hip surgery with pelvic hematoma in Case 1 and enema in Case 2) seems to be more than coincidental, since such a relationship exists in the only case found in the literature.⁵ Morson has pointed out that in colonic diverticulitis the inflammation does not usually affect the bowel wall to any great extent, being primarily an extraluminal process that could be influenced by intraluminal and extraluminal factors. As emphasized by Fleischner and Ming,⁷ the diagnosis of diverticulitis implies the microscopic or macroscopic rupture of a diverticulum. This perforation leads to an inflammatory process predominantly located outside the colonic wall, more accurately referred to as "peridiverticulitis," that may progress to abscess and fistula formation, with an eventual communication with the extraperitoneal space.

In acute diverticulitis, after distal obstruction, perforation, and fistulization into the extraperitoneal space have occurred, peristalsis and increased intra-abdominal and intracolonic pressure could easily force gas along the tissue planes, causing pneumoretroperitoneum, pneumomediastinum, subcutaneous emphysema, and, in general, a gaseous dissection toward areas of low pressure. When the distal obstruction is released, the subcutaneous emphysema disappears in a short while, the lack of uniformity of its reabsorption being due to different tissue conditions. In neither of our patients did the wide diffusion of colonic gas cause any distal infection. The absence of gangrene could be confirmed by the slow progression of the disease, moderate fever, and lack of toxicity; and no surgical attempts were made to drain the subcutaneous gas. More patients with complication of acute diverticulitis are undergoing resection and anastomosis safely in one stage. Previously, a thickened mass in the region of the sigmoid dissuaded surgeons from attempting a primary resection. If this tumefaction represents a small localized abscess in continuity with the bowel, or the thickened bowel itself, resection with or without primary anastomosis, may be carried out safely, especially if there has been a

chance to prepare the bowel. Otherwise exteriorization of the inflamed segment or extensive local drainage, complemented by diversion of the

fecal stream by a transverse colostomy and wide-spectrum antibiotic coverage, seems to be the most logical way to proceed.

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Be a physician, Faustus, heap up gold,
 And be eternized for some wondrous cure.
"Summum bonum medicinae sanitas."
 "The end of physic is our body's health."
 Why, Faustus, hast thou not attained that end?
 Is not thy common talk sound aphorisms?
 Are not thy bills hung up as monuments
 Whereby whole cities have escaped the plague,
 And thousand desperate maladies been eased?
 Yet art thou still but Faustus, and a man.
 Wouldst thou make man to live eternally,
 Or, being dead, raise them to life again,
 Then this profession were to be esteemed.
 Physic, farewell.*

*Christopher Marlowe, *Doctor Faustus*, I.i.14-27, 1592.

Contaminated Pacemaker Lead Wire

Causing Chronic Pseudomonas Septicemia

DAVID KLEVAN*, HORACE H. ZINNEMAN, M.D., WENDELL H. HALL, M.D.
and YOSHIO SAKO, M.D.

A TRANSVENOUS INTRACARDIAC pacemaker electrode became infected two months after insertion. It was embedded in the myocardium of the right ventricle, and attempts to remove it were at first abandoned because arrhythmias arose whenever traction was applied to the electrode wire.

The available alternatives lay between (1) certain disaster with continued bacteremia which was suppressed only temporarily by antibiotic therapy, and (2) possible cure after forcible removal of the infected electrode.

The spectacular outcome of this episode emphasizes the necessity of the removal of such foreign bodies when septicemia is persistent and unresponsive to chemotherapy.

Case Report

A 73-year-old man with a history of several pacemaker implantations was admitted on October 30, 1970 because of recurrent fever. Past medical history included a total laryngectomy and permanent tracheostomy in 1948 for laryngeal squamous cell carcinoma, with one recurrence. In 1952 he developed complete heart block. A demand pacemaker was inserted in November 1967 via the right jugular vein. Because of pacemaker failure, a new pacemaker and electrode wires were installed in July 1969 via the left jugular vein. In September, 1969, the patient suffered infection of the right jugular wound with *Staphylococcus aureus*. The staphylococcal septicemia which ensued was treated with multiple drugs and finally controlled with dicloxacillin. Removal of the pacemaker lead from the right ventricle was attempted in September 1969 but any traction applied to the catheter resulted in atrial fibrillation. Since it was suspected that the electrode was deeply embedded in the myocardium of the right ventricle, the electrode wire was severed at the level of the innominate vein and the electrode terminus was left embedded. The patient was discharged on oral dicloxacillin, which was continued through the spring of 1970.

The patient was seen again on August 11, 1970 for back pain of one month's duration. Vital signs were: temperature 97.8°, pulse 72 and blood pressure 150/80. Physical examination revealed a small amount of purulent

discharge coming from the tracheostomy, a pacemaker pack in the left anterior chest wall and a systolic ejection murmur. Initial white blood count was 11,000/cmm with 80% polymorphonuclear, five stabs, 10 lymphocytes and five monocytes. On August 23 blood cultures yielded *Pseudomonas aeruginosa*. *P. aeruginosa* was also cultured from the sputum. Complaints of severe lower backache led to roentgenologic examination of the spine and the discovery of a defect with surrounding osteoblastic reaction in the body of L₂ vertebra. Needle aspiration confirmed the clinical impression of osteomyelitis. Bacterial culture of the specimen yielded *S. epidermidis*, D Nase negative. Treatment was begun with daily doses of 150 mg gentamicin, 30 gm carbenicillin and 12 gm oxacillin from August 23 through September 13 and then continued with 1 gm dicloxacillin per day. With negative blood cultures and resolution of his fever, the patient was discharged on September 24.

Fever returned in early October and the patient was seen again on October 30, 1970 still on dicloxacillin therapy. The initial blood cultures were negative; later both blood and sputum again yielded *P. aeruginosa*. Fever appeared concurrently. *In vitro* susceptibility was



Figure—Chest Xray on 12-10-70 showing pacemaker with lead wires, as well as cut-off retained lead wire in right side of the heart.

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tested by tube dilutions as shown in the Table, there being some evidence of synergism between gentamicin and carbenicillin. Gentamicin 180 mg per day was started intramuscularly on November 25 and carbenicillin 30 gm per day intravenously on December 4. Both were discontinued on December 8. Chest Xrays (Figure) revealed both the functioning pacemaker and the severed electrode. Since it had become evident that the infection and bacteremia could not be eradicated by antibiotic therapy in the presence of the foreign body, it was again decided to attempt removal of the electrode, this time under direct visualization of the right ventricle by thoracotomy. Surgery for removal of both of the pacemaker leads followed on December 11. The embedded short lead could be removed only by sudden traction, which caused a momentary invagination of the endocardial wall. A 10 mm x 7 mm x 3 mm piece of trabeculae carneae from the right ventricle remained attached to the lead. A 300 cc hemorrhagic pericardial effusion was drained. Temporary epicardial leads were then installed. Separate cultures of the catheter tip and the trabeculae carneae yielded *P. aeruginosa*; cultures of the pericardial effusion were sterile.

The patient was placed on carbenicillin 30 gm per day for seven days and then eight gm per day for seven days. Four days following surgery he became afebrile and remained so for the duration of his hospital stay. He was discharged on January 19, 1971 after installation of permanent pericardial leads connected to the pacemaker pack.

Escape from the pacemaker pulse required readmission in July 1971. A pacemaker pack of higher voltage was inserted. The patient had been afebrile throughout the intervening period, and has since been followed in the outpatient Department for periodic adjustment of the pacemaker. There have been no recurrences of fever through October 1972.

TABLE

Susceptibility of <i>P. aeruginosa</i> to Selected Antibiotics		
	MIC* (mcg/ml)	MBC† (mcg/ml)
carbenicillin	62.5	62.5
gentamicin	.2	1.56
carbenicillin +		
Gentamicin (1:1)	2.0/	3.9/
	.2	.39

MIC* = minimum inhibitory concentration.

MBC† = minimum bactericidal concentration.

Discussion

This case exemplifies the role of foreign bodies in the development and persistence of infections which often continue despite adequate drug therapy.¹ Foreign bodies associated with trauma may cause serious problems if their location makes removal difficult or if they are not suspected. They may be of various materials. Ferguson reports two cases of infected wood fragments in the orbit where the infection remained refractory to all treatment until the wood was removed

surgically.² Fatal *Candida* septicemia refractory to prolonged antibiotic treatment was found at autopsy to be due to a toothpick which was embedded in the right myocardium.³ Infected foreign bodies may consist of suture material, catheters, artificial grafts or orthopedic prostheses. Bahnson reports five cases of infected silk sutures placed in the heart and great vessels, which were refractory to antibiotic therapy until successfully treated by surgical removal.⁴ Amoury reports that, in his series of 13 infected intracardiac prostheses treated with antibiotics, nine died and two infections were clinically suppressed by long term antibiotics, but one was suppressed and then cured surgically. Only one was cured by a six weeks course of antibiotics alone. The latter was the only case due to *Serratia marcescens*, all others were caused by *Staphylococcus epidermidis*.⁵ A series of 51 similar cases reported by Bainbridge resulted in survival of 10 of 43 patients under medical therapy and three out of eight with surgical treatment.⁶ He does not mention whether survival in those treated medically represented continuous suppression or cure. Littlefield reported a case of an infected aortic valve prosthesis where antibiotics did not suppress the septicemia but surgery resulted in cure.⁷ Three cases of infected prosthetic arteriovenous shunts placed for maintenance hemodialysis, were reported by Goodwin and required removal of the functioning shunts.⁸ Several authors conclude that infection of ventriculoatriostomy catheters and valves can be suppressed by antibiotics but cured only with removal of the offending foreign body.⁹⁻¹¹ The same conclusion has been reached in reports of catheter emboli to the heart and pulmonary artery.¹²⁻¹³ Waissner reports septic pulmonary emboli arising from a transvenous cardiac pacemaker, cured by a combination of antibiotics and removal of the entire pacemaker apparatus.¹⁴ In a series of 12 infected pacemakers, Firor had three deaths due to infection, all occurring in the first group of six where the pacemakers were not removed. A regime including removal of all foreign material resulted in cures of the next six cases.

Foreign bodies greatly lower the number of bacteria necessary to cause infection, both in animals¹⁶⁻¹⁷ and man.¹⁸⁻¹⁹ This fact has been used to develop an experimental model for production of both right and left sided endocarditis.²⁰⁻²¹ No adequate explanation of this phenomenon has yet been verified. McDermott also emphasized the

adaptability of the infective microorganism in its interaction with various host environments, including presence of antibiotics.²² Drug penetration often does occur. Antimicrobial inactivation by purulent material is thought not to be important.¹ MacLennan noted that clostridial gas gangrene

following penetrating wounds often is due to the presence in the wound of foreign bodies, such as bits of clothing, particles of dirt and fragments of metal and wood.²³

The removal of any infected foreign material appears imperative for cure of serious infection even if this involves great risks.

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The Aortocranial Vessels

The Transfemoral Approach

Analysis of Results and Complications

EDWARD L. TALBERTH, M.D.* and LAWRENCE H. A. GOLD, M.D.†

DURING THE PAST decade the use of the transfemoral approach for selective catheterization of the brachiocephalic arteries has gradually become more popular. While the major emphasis has been on selective vertebral arteriograms,^{1,7} the versatility of the procedure lends itself to rapid examination of the carotid system as well. Many physicians now perform the majority of their carotid studies via the femoral route with excellent results. In our institution the incidence of transfemoral selective catheter studies has increased from 5.2% of all cerebral angiographic procedures in 1969 to 20.4% in 1972.

This paper is an analysis of 230 transfemoral catheterizations of the brachiocephalic arteries performed by the Neuroradiology section of the Department of Radiology at the University of Minnesota Hospitals from January 1969 to April 1972. The examinations included not only vertebral and carotid angiography, but also spinal cord angiography, arch aortography and selective subclavian angiography. The average age of the patients was 45.8 years. There were 113 males and 117 females.

Technique

After sedation with Seconal, Demerol, and atropine and appropriate cleansing and draping of the groin area, 10 cc. of 1% Xylocaine are infiltrated into the skin and around the femoral artery. The femoral puncture is made with an Amplatz 19 gauge needle with a Teflon sheath. Using the Seldinger technique, a Teflon coated 100 cm. guide wire is passed into the abdominal aorta over which a Cordis No. 8 French "head-hunter" catheter is passed. Following removal of the guide wire, the catheter is flushed with heparinized saline (1000 units per 500 ml. saline). The catheter

is then advanced up into the aortic arch under fluoroscopic control.

In most adult patients the combination of the "head-hunter" catheter, and occasionally the use of a Teflon coated "J" shaped or graduated stiffness guide wire is sufficient to catheterize the carotid and vertebral arteries. Very rarely, a Cordis "shepherd's crook" catheter may be required in patients with a very tortuous aorta. After entering the common carotid artery the catheter is advanced just proximal to its bifurcation and an injection is made with 12 cc. contrast medium using an Amplatz injector under 45 pounds per square inch of pressure. The usual filming sequence is two films per second for three seconds and one film per second for four seconds, a total of ten exposures over seven seconds. Immediately following the injection the catheter is removed from the carotid artery. If selective visualization of the external and internal carotid arteries are needed, the catheter is maneuvered into these vessels and further injections of contrast medium are made. For vertebral angiography the origins of both vertebral arteries are visualized utilizing injections into the subclavian arteries under fluoroscopic control. The larger vertebral artery is selected for injection as this reduces the risk of arterial occlusion by the catheter. In order to keep the time the catheter is in the vertebral artery to a minimum the tip of the catheter is first placed at the orifice of the vessel and the patient's head positioned for angiography. Under fluoroscopic control the catheter is then advanced into the vertebral artery. The patient is then rapidly positioned on the film changers and a forceful hand injection of 8 cc. of contrast medium is made into the artery. The catheter is immediately withdrawn into the aortic arch and flushed with heparinized saline.

After reviewing the films to determine technical quality and the need for additional views, the

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catheter is removed from the femoral artery. The technique described by Jeffrey² is used. This involves suction on the catheter during removal to extract any adherent thrombus out of the puncture site. The artery is also permitted to bleed for approximately one second in order to express any possible clot. If no bleeding occurs after removal of the catheter massage of the vessel proximal to the puncture site may express a clot. Pressure is then placed on the femoral artery for six to ten minutes and the puncture site is observed for several additional minutes to make certain bleeding has ceased. If the dorsalis pedis and/or the posterior tibial pulses are diminished from their preoperative status 10 cc. of 1% Xylocaine are infiltrated around the artery to relieve any spasm.

Presently all the intracranial studies are routinely magnified in both frontal and lateral planes using simultaneous biplane exposures.³ The carotid angiograms are magnified 1.5 times and the vertebral angiograms 2.0 times.

Eight spinal cord angiograms were performed via the transfemoral route, in search of a spinal cord arteriovenous malformation. There were four arch aortograms and three subclavian or innominate angiograms. Eight patients had combined carotid and subclavian angiograms. The aortograms and innominate and subclavian angiograms were done primarily for atherosclerotic disease and/or vertebrobasilar insufficiency.

The breakdown of examinations by age group is shown in Table 1. The relatively large number in the 50-60 year group reflects those patients being evaluated for atherosclerotic disease in the carotid arteries.

Results

Analysis of the number and type of studies performed is shown in Table 2.

In a majority of patients visualization of multiple vessels was needed. Relatively few arch studies were done. When it was desired to demonstrate the origin of the great vessels, an injection of contrast medium was performed proximal to the orifice of the vessel. In our experience this gives excellent visualization of the origin of the brachiocephalic vessels. The origin of the left carotid artery can be visualized with an injection at its origin and compression of the left carotid artery. This results in reflux down the carotid into the aortic arch.

We have attempted to analyze the number of instances where desired visualization of a vessel could not be obtained. An attempt was made to catheterize 320 carotid arteries in 180 patients and was unsuccessful in 16 instances, a failure rate of five percent. In nine cases the right carotid could not be catheterized and in seven cases the left carotid could not be entered. The average age of these patients was 61 years. The high frequency of very tortuous, atherosclerotic aorta in this age group often makes catheterization extremely difficult. All of these patients had subsequent visualization of the carotid artery by either direct puncture or retrograde brachial angiography.

Attempts were made to catheterize a vertebral artery 188 times. In only three cases was the study unsuccessful, a failure rate of 1.6%. The average age of the three patients was 65 years.

The left vertebral was studied three times as often as the right. This is because it was easier to enter and often larger than the right. Both vertebral arteries were examined in 19 instances.

There were no cases where the catheter could not be passed beyond the iliac arteries into the thoracic aorta. In one instance the opposite femoral artery had to be punctured because of inability to pass the guide wire beyond the right iliac artery.

Complications

We have divided the complications of the transfemoral approach to the brachiocephalic vessels into two categories: neurologic and femoral. There were no deaths in this series.

Neurologic Complications

Neurologic complications occurred in four patients.

TABLE 1

Age	Number of Studies
0-10	3
11-20	22
21-30	18
31-40	32
41-50	43
51-60	70
61-70	34
71+	8

TABLE 2

Study	Number of patients
Carotid arteriography	19
Vertebral arteriography	35
Carotid & vertebral arteriography	153
Spinal cord angiography	8
Arch aortography	4
Subclavian or innominate arteriography	3
Carotid & subclavian arteriography	8
Total	230

tients or 1.7%. The average age of these patients was 58 years. The findings are summarized in Table 3.

TABLE 3

Neurological Complications	No. of Cases
Hemiparesis clearing within several hours	2
Pronounced dysphasia and decreased sensorium	1
Loss of vision, confusion	1
Total	4

The first patient was a 57-year-old woman with angina pectoris and transient ischemic attacks on the right side. She experienced angina pectoris during the study. Angiography demonstrated an 80% occlusion of the right common carotid bifurcation. Three hours after the completion of the procedure she developed a profound left hemiparesis which cleared completely in ten minutes. It is questionable whether the hemiparesis was related to the angiography since it occurred several hours after completion of the study.

The second patient was a 65-year-old woman who underwent examination of her right and left carotid and left vertebral arteries following placement of a Selverstone clamp on the right common carotid artery for an intracranial aneurysm. Angiography demonstrated complete occlusion of the right common carotid artery from the clamp with poor collateral circulation to the right middle cerebral artery. Shortly after completion of the study she developed pronounced dysphasia, confusion and decreased sensorium. After several hours she gradually improved to her preangiogram condition. It may be that dilution of blood by contrast medium in an already partially hypoxic area contributed to the problem. Kutt and Verbeily⁴ have suggested that during injection up to two-thirds of the fluid in the carotid artery may briefly consist of contrast media. In individuals whose circulation is already compromised this temporary reduction in oxygen could be of clinical significance.

The third patient was a 58-year-old man who entered the hospital following the sudden onset of a left hemiparesis. He underwent right common carotid and left vertebral arteriography which revealed a 90% stenosis of the right internal carotid artery and an occlusion of a right middle cerebral branch with retrograde collateral filling. After the vertebral artery injection, the patient became confused and disoriented with a partial loss of vision. There was gradual improvement

over the next two days with return of function to his preangiogram status.

The fourth patient was a 54-year-old male admitted following a subarachnoid hemorrhage. There was no history of hypertension. A left vertebral angiogram was performed first, followed by a right common carotid study. The films demonstrated a basilar artery aneurysm but no evidence of occlusion in the right carotid circulation. Toward the end of the procedure the patient developed a left hemiparesis. An intravenous infusion of Rheomacrodex was started with gradual regression of the symptoms over several hours.

Femoral Complications

The femoral complications we experienced were all related to the femoral artery through which the catheter was passed (Table 4). There were five cases of femoral artery thrombosis (an incidence of 2.1%), six cases of large groin hematomas (2.6%), and seven instances of decreased peripheral pulses which did not progress to thrombosis and which did not require surgery (3.1%).

TABLE 4

Femoral Complications	No. of Cases
Femoral Artery Thrombosis	5
Large Groin Hematoma	6
Diminished Peripheral Pulses	7
Total	18

All five cases of femoral thrombosis had surgical exploration with a Fogarty catheter under local anesthesia followed by complete recovery. There was no loss of limb or residual claudication. The average age of the five patients was 36 years. One patient was two and a half years old. All instances of femoral thrombosis occurred before we started using the method of removing intra-arterial clots advocated by Jeffrey.²

Analysis of the five cases showed that four of the five patients were either paraplegic or hemiparetic before the procedure. This implies that since there was very limited use of the lower extremities, the muscular tone in those extremities was poor and most probably the same was true for the arteries supplying those muscles. Two of the patients also had severe atherosclerosis affecting the femoral artery.

Lang⁵ in his analysis of complication of 11,000 femoral catheterizations noted that arterial thrombosis appeared to be associated with poor vascular fitness of the individual. Other predisposing factors in his series were low output failure and arteriosclerotic vascular changes.

There was some correlation between the occurrence of large groin hematomas and diminished peripheral pulses and the length and difficulty of the procedure. Large groin hematomas were encountered in six patients (2.6%). Four of these had prolonged examinations because of tortuosity of the brachiocephalic vessels. One patient was on anticoagulants. Three patients were markedly hypertensive, making control of bleeding from the femoral artery quite difficult. The hematomas did not require evacuation nor did they result in hypotension or blood transfusion. There was no case of false aneurysm formation associated with this complication. Seven patients, an incidence of 3%, had a mild to moderate decrease in the peripheral pulses at the end of the procedure. The average age was 45 years, and affected six females and one male. Again, prolonged studies with considerable manipulation of the catheter seemed to have enhanced the possibility of arterial spasm. The diminished peripheral pulses may also result from small platelet thrombi which adhere to the catheter and then remain in the arterial lumen when the catheter is removed. These small clots would then be free to migrate to small distal vessels. The problem of small platelet thrombi left in the artery is partially overcome by the technique of Jeffrey.² Young patients, particularly females, tend to have more arterial spasm with less manipulation of the catheter than older patients. The treatment in cases of diminished peripheral pulses is to infiltrate the tissues about the femoral artery with Xylocaine. This usually relieves the spasm and results in good peripheral pulses. The patient's leg is observed closely over the next six hours.

Indications and Contraindications

The indications for the transfemoral approach to the brachiocephalic vessels are listed in Table 5. There are several possible reasons why a carotid artery cannot be punctured percutaneously in the neck such as: when the patient is extremely obese, when a hematoma is present in the neck from a previous attempt at carotid puncture, when there has been a subintimal injection of contrast medium, or when there has been previous surgery or irradiation of the neck making percutaneous puncture more difficult, or simply when the carotid artery cannot be punctured for any reason.

When it is necessary to visualize multiple vessels, usually in a patient with subarachnoid hemor-

rhage without focal neurologic findings, it is much easier for the patient and faster to approach these vessels from the femoral route with a catheter rather than to do three punctures percutaneously in the neck and arm (bilateral brachial and left carotid angiograms). In patients suspected of having an arteriovenous malformation, the malformations are frequently fed by multiple vessels including branches of the external carotid, and it is necessary to visualize the entire vascular supply to the malformation.

In patients suspected of having cerebrovascular atherosclerotic disease where surgical intervention is being considered, it is often desirable to visualize multiple vessels. There is some increased risk to direct carotid puncture as the puncture may be made at the site of an already severely narrowed artery or at the site of a large ulcerated atheromatous plaque. For these reasons, the catheter approach is more desirable, since the catheter placement is not a blind procedure, but done under fluoroscopy and the injection of contrast medium is made proximal to the usual site of the patient's occlusive disease. Also, the catheter approach will allow visualization of the origins of the carotid and vertebral arteries. In all cases the catheter approach is faster, easier and requires less contrast medium than visualizing the origins of the vessels from bilateral brachial injections.

To visualize the posterior fossa either for tumor, aneurysm, malformation or occlusive disease, selective vertebral arteriography is essential and is best done with the catheter approach rather than a direct vertebral artery puncture.

Finally, if it is necessary to do selective injections into smaller branches of the brachiocephalic arteries for any reason, this can only be done with a catheter.

There are several relative contraindications to the transfemoral approach. Elderly patients over the age of 65 usually will have extremely tortuous vessels at the aortic bifurcation and in the aortic arch which makes the catheter approach much

TABLE 5

Indications for Transfemoral Approach

1. Unable to do percutaneous puncture.
2. Need to visualize multiple vessels.
 - a. Intracranial aneurysm.
 - b. Arteriovenous malformation.
 - c. Cerebrovascular atherosclerotic disease.
3. Posterior fossa angiogram desirable for any reason.
4. Selective injections into small vessels is necessary.
 - a. External carotid.
 - b. Thyrocervical trunk.
 - c. Costocervical trunk.

more difficult and increases the risk of neurologic and femoral complications. However, age alone should not be an absolute contraindication and each case must be evaluated on its own merits by weighing the possible complications against the desirability of obtaining a complete and satisfactory study.

Another contraindication to the catheter approach is the patient with severe peripheral vascular disease in the legs with or without absent peripheral pulses in the foot. These patients probably should not have a catheter approach from the femoral artery as there would be a significant danger of severe complications in the leg. The axillary approach, with a catheter, is often a satisfactory alternative.

Discussion

Recent articles^{1,6,7,8} on the various techniques available for visualization of the brachiocephalic vessels have all stressed the great versatility which the femoral route allows, while at the same time being comparatively free of serious complications. Using the femoral approach our success rate of 95% in carotid arteriography and 98% in vertebral studies compares very favorably with similar reported series.

Examination of the vertebral arteries is now almost completely done with the transfemoral technique. If the vertebral artery cannot be catheterized, then a left or right retrograde brachial study is performed. The brachial study however often results in inadequate visualization of the posterior fossa vessels, does not visualize the contralateral posterior inferior cerebellar artery, and gives insufficient information for the evaluation of tumors of the posterior fossa. It merely rules out very gross abnormalities.

We were able to obtain completely successful examinations of the posterior fossa in 98% of patients. The main difficulty was very tortuous vessels in elderly patients. The average age of the failures was 65 years.

The issue of most common concern is that of the neurologic sequelae of angiography. Of the four patients with neurologic complications in this series, two experienced hemiparesis, one had loss of vision and one suffered decreased sensorium and dysphasia. All these symptoms cleared within several minutes to several days, with no permanent neurologic deficit.

In our series there was not a significantly greater

number of neurologic problems with the vertebral studies as compared to the carotid studies. Other authors^{1,9} have commented on the greater risk encountered with posterior fossa angiography.

We have minimized the risk of posterior fossa angiography in several ways: by injecting into the larger vertebral artery so that the catheter does not obstruct the vertebral artery, by doing a hand injection of a small volume (8 cc.) of contrast medium rather than using a power injection, by having the x-ray technologist being ready to take the radiographs before the catheter is placed in the vertebral artery and by immediately withdrawing the catheter from the vertebral artery once the injection has been completed.

There are a number of theories regarding the etiology of neurological complications. Adams¹⁰ suggests that emboli from foreign substances such as cotton fibers may be responsible. Wishart¹¹ raises the possibility of the catheter tip dislodging atheromatous plaques from the arterial wall. Another possibility is the dislodging of small platelet emboli from the end and sides of the catheter during manipulation of the catheter. Finally, Kutt and Verbely⁴ believe that part of the problem is a relative ischemia produced by diluting the blood with contrast medium during the injection. Normally, this would not cause any problems. However, in a patient who already has diminished cerebral blood flow because of atherosclerosis, this dilution may be critical.

Both the neurological and femoral complications can be kept to a minimum by following certain basic principles. The catheter study must be done quickly and efficiently, with the radiologist and the x-ray technologist working as a team. The procedure should never take more than one and a half hours to complete. The longer the procedure, the higher the incidence of complications. The catheter should only very rarely be changed since this prolongs the procedure and increases the risk of femoral complications. Thrombus material on the sides of the catheter is peeled off as the catheter is exchanged and this thrombus cannot be retrieved. The catheter should be removed from the vessel immediately following the injection. The amount of contrast medium used should be kept to a minimum and should not exceed a total volume of 200 cc. The patient must be monitored frequently during the study by the radiologist for any changes in sensorium, reflexes, blood pressure, and ability to move his extremities. Any

change in the patient's condition should result in termination of the procedure.

The technique of Jeffrey² should be employed. It is our opinion that the removal of thrombi stripped from the catheter during its removal significantly decreases the femoral complications.

Summary

The technique, indications, and results of the catheter approach to the aortocranial vessels in 230 patients have been described and the com-

plications of the procedures investigated. Different theories as to the etiology of these complications were suggested and possible methods of prevention described. A success rate of 95% for carotid artery examinations and 98% for vertebral artery studies was achieved. The overall serious complication rate was low and likely will continue to decline in the future as more studies are performed and new techniques and materials are developed.

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Cover Painting "Split Rock Lighthouse"

Dr. Tague Chisholm, a pediatric surgeon, has been interested in doodling and drawing since childhood. He says that many of his professional patient files in the office have diagrams and drawings rather than words. Other than mechanical drawing in high school, Dr. Chisholm has never had any formal art instruction. His real interest in painting began following an automobile accident in 1965. During this time he tried line drawings, charcoals, water colors, until one day David Feigal came to see him stating that it was time to start real painting and provided him with a box of oils. Because of patient complaints in the next rooms of the oil odors, Dr. Chisholm dropped oil painting and pursued water colors.

In 1971 he heard that in-service art lessons were being offered at North Memorial Hospital and went up to their classes for eight weeks. That is where he learned about Acrylics without their odor and with their fantastic qualities for painting.

Each year during his annual vacation on Nantucket Island, Dr. Chisholm paints one picture every other day for the whole month's vacation, and as a result has earned the title of "The August Painter."

Dr. Chisholm wrote the Editors: "Most of the time I like to paint directly from my sight. I have never painted from a projected picture of a Kodachrome slide. My subjects are mostly landscapes, seascapes, waterscapes, and architectural forms. I'm especially fond of lighthouses. I now have done nearly two dozen of them from Portland, Oregon to Portland, Maine. Lighthouses make a fascinating study since they are a disappearing segment of Americana. Almost all have had their lights turned out. Most are no longer manned by a lighthouse keeper and a good many have been demolished and torn down. I find the story of the Split Rock Lighthouse on the North Shore extremely fascinating. This is one of the parts of Minnesota which I love the most; it's very much like where I come from in the State of Maine."

The Cell Separator

A Continuous Flow Centrifuge for Blood Component Collection

L. CRANDALL, M.D.*, I. E. FORTUNY, M.D.,† J. McCULLOUGH, M.D.‡
and B. J. KENNEDY, M.D.¶

IN THE PRACTICE of clinical medicine, physicians may be confronted with situations where either the administration or removal of single blood components is of the utmost importance. In the past, limited technology has made such a procedure physiologically impractical. The introduction of plastic bags for blood collection made it possible to produce several products from a single unit of blood. Later, the technique of plasmapheresis improved the ability of the blood bank to collect plasma without the limitations of red cell loss incurred by the donor. However, plasmapheresis, being a system of intermittent blood collection and return to the donor, made the processing of large volumes of donor blood impractical.

Recently, a cell separator has been developed to process large quantities of whole blood in a closed, sterile, continuous flow system. The desired blood component, or components, are removed and the remaining blood returned to the donor. This instrument, which was devised by investigators at the National Cancer Institute and the Systems Development Division of the International Business Machines Corporation, has been established as safe for clinical use by both animal experimentations and human use.¹⁻⁶ Two models of this instrument now available are the NCI-IBM Blood Cell Separator and the Aminco Celltrifuge (American Instrument Co.).

An Aminco Celltrifuge was added to the support facilities of the Masonic Leukemia Treatment Center in the Masonic Memorial Hospital of the University of Minnesota Health Sciences. Invest-

igations of its applicability to clinical oncology were undertaken by the Section of Medical Oncology and the Blood Bank.

The Celltrifuge

In a closed, sterile system an uninterrupted flow of blood is maintained in a constant force of gravity while collection of individual blood components is in progress. This continuous flow makes the separation of components of almost equal density (red blood cells and plasma) possible as well as the separation of smaller fractions of intermediate density (leukocytes and platelets). Red cells, plasma, leukocytes and platelets, individually or in a desired combination, can be collected or returned to the donor in a continuous flow of several times the donor's blood volume.

The size and shape of the machine can be seen in Figure 1. A central drive well lodges the

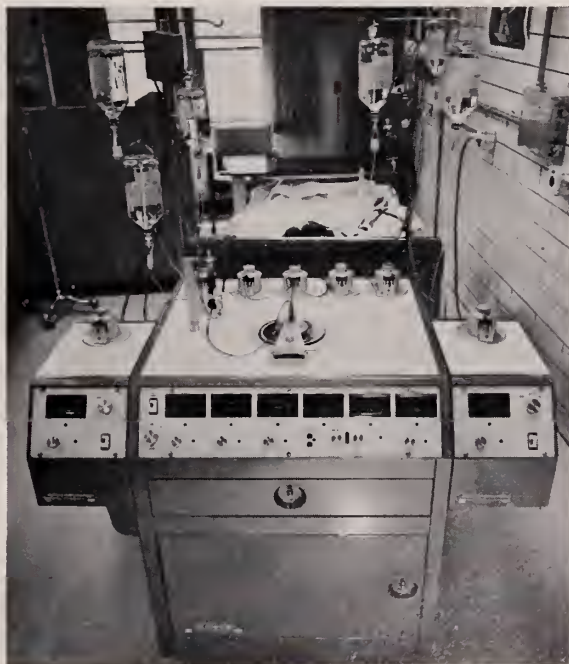


Fig. 1—The celltrifuge.

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centrifuge bowl. Peristaltic pumps are used to draw the red cells, buffy coat and plasma through the system while different pumps remove the component to be separated during the procedure. The centrifuge bowl (Figure 2-A) is made of a heat resistant polycarbonate plastic. The center core has a central flow path four inches long and 0.04 inches wide and an outer (Figure 2-B) flow path with a flared portion where the blood components separate into three distinct layers; an outer red cell layer, a middle buffy coat layer, and an inner plasma-platelet layer. The effective radius of the bowl is 2.5 inches. The bowl is tightly closed by a clear plastic cover (Figure 2-C) containing three exit ports which collect the contents of the three blood layers. The clear plastic cover allows the operator to observe the actual separation of the blood components and to adjust the system to give optimum collection.

The most critical part of the instrument is made up of two components, one a rotating multichanneled flat ceramic seal (Figure 2-D) and the other a stainless stationary portion (Figure 2-E) which contains the ports of entry and exit of the blood flowing through the centrifuge bowl. The surfaces of the seals are held to a flatness of 30×10^{-6} of an inch and lubricated with saline solution, making the system hemolysis free. The assembled bowl is shown in Figure 2-A.

Procedure

The instrument is primed with acid-citrate-dextrose (ACD) anticoagulant solution to elimi-

nate all air from the system. The total volume contained in the tubing lines and centrifuge bowl is 150 ml. At the end of the procedure all but 50-70 cc of blood, which cannot be pumped out of the bowl, returns to the donor.

The donor is connected to the machine by ante-cubital venous punctures (gauge 14-15). A bolus of 2,000 units of heparin is given when the needles are in place. An ACD drip of 1 ml. per 20 ml. of whole blood plus heparin-saline at a rate of 15 units per minute is delivered to the inflow line leading to the machine. The blood flow can be maintained between 40-65 ml per minute depending on the size of the venipuncture needles. The procedure is usually carried out during a four hour period at which time a total of 400-500 cc of ACD solution and 4,000-4,500 units of heparin have been given to the donor.

Clinical Uses

Preliminary investigations have explored the uses of this apparatus. Certainly as a source of variable blood components, it offers a material source for basic research studies dealing with specific blood cell components. Although currently regarded as an investigative procedure, early results already are defining the potential clinical uses of the machine and projections are being made as to its role as a service unit in clinical medicine.

Leukapheresis

Leukapheresis is the removal of leukocytes from either normal donors or from patients with acute or chronic leukemia. The collection efficiency for leukocytes is variable within a range of 25-35% recovery, which in normal donors represents a granulocyte mass of $0.8-1.63 \times 10^{10}$ granulocytes in a volume of 250-300 ml. Granulocyte recovery from patients with chronic myelogenous leukemia varies between $0.4-3.11 \times 10^{11}$ cells in a four hour run.

Thus, two clinical uses for granulocytes are evident: granulocyte transfusion to leukopenic patients and leukocyte removal in the management of patients with chronic leukemia.

In studies of granulocyte transfusion to patients with acute leukemia undergoing chemotherapy remission induction, it has been shown that lysis of fever occurs following granulocyte transfusion and that the chances of such improvements are directly related to the number of transfused granulocytes.^{5,7}

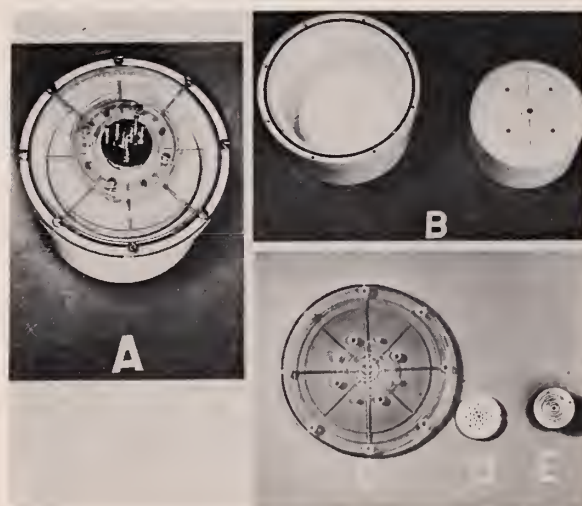


Fig. 2—Assembled centrifuge bowl (A); ceramic bowl (B); plastic cover (C); ceramic seal (D) and stationary stainless steel port (E).

In measuring the increase of peripheral leukocyte counts following granulocyte transfusion, there is a higher recovery of the transfused granulocytes when the donors are blood relatives of the leukopenic recipient.⁸ When the donor and patient are identical twins the mean recovery of transfused granulocytes is 43.0%. This ratio decreases to 27.0% when siblings are used and drops further to 11.8% when parents are used.

Although the recovery of granulocytes from non-related donors is approximately 5%, it has been claimed that lysis of fever does occur following such transfusion to acute leukemic patients undergoing chemotherapy for induction of remission of the leukemia.

Current investigations are directed toward determining the fate of transfused granulocytes by studying their survival in the peripheral blood, and by stimulating their release from the bone marrow and marginal pools. It is further apparent that careful leukocyte typing will be necessary between donor and recipient similar to that now performed for transfusion of red blood cells.

It has been proposed that leukapheresis as an initial management of the symptomatic patient with chronic leukemia may allow a return to a symptom free situation as a result of the reduction of leukocyte mass and organomegaly; thus postponing the use of chemotherapy.⁹⁻¹⁴ This proposal is based upon the assumption that in chronic leukemia leukocytes progressively accumulate either because of increased marrow production, prolonged leukocyte survival and/or an overwhelmed removal mechanism.¹⁰

Our studies on a limited number of patients suggest that there are two different populations of chronic leukemia patients, only one of which can benefit from leukapheresis. Appropriate leukokinetic studies are being incorporated to determine the type of patient and the time at which leukapheresis may be a valuable therapeutic method in the overall management of chronic

leukemia.

Plateletpheresis

Collection of platelets can be accomplished efficiently by standard blood bank techniques and the celltrifuge offers no practical advantage. However, platelet collection can be efficiently carried out during leukapheresis; thus providing the Blood Bank with another source of platelets which are in great demand during the initial treatment period of acute leukemia.

Plasmapheresis

Plasma exchange by the use of the cell separator has been shown to be safe, rapid and with clinical benefits (replacing globulins and albumin) which surpass conventional plasmapheresis.¹¹ Thus, it may be of value in the treatment of patients with paraproteinemias, hepatic coma,¹² and in patients with large amounts of circulating antibodies (i.e. hemophiliacs with large amounts of anti-factor VIII antibodies.¹³ Although introduced for the support of patients with acute leukemia, it is already apparent this apparatus will have a wide variety of clinical uses beyond those required in oncology. Such investigations clearly emphasize that cancer research extends its benefits to all medicine fields.

Summary

The cell separator offers a safe, rapid and effective method for procurement of blood components, especially leukocytes, platelets and plasma for transfusion. The major clinical uses are leukocyte collection for transfusion to patients with leukopenia, and leukocyte removal in the management of patients with chronic leukemia. The role of leukocyte transfusion in infected patients with leukopenia remains to be clarified as does the treatment of chronic leukemia by cell removal alone. The cell separator is an ideal instrument for the rapid exchange of plasma in patients with paraproteinemia, hepatic coma or circulating antibodies.

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- 9-14. Will be found on page 764.

Sequential Obstetric-Pediatric Intensive Care

RICHARD S. SHELDON, M.D.*

DURING THE PAST FEW YEARS, increased attention has been placed on fetal and neonatal salvage. This attention was stimulated by international reports that compared perinatal mortality data among various countries. The data from the United States ranked well down on the list.¹

Spokesmen in the field of obstetrics have re-emphasized the need for close prenatal observation, testing suspected abnormalities during prenatal care, and fetal monitoring during labor.²⁻⁴ Pediatricians continue to emphasize the basics of infant body temperature, early observation of acid-base balance, and exact blood-oxygen saturation. Strides also have been taken to better manage respiratory distress in the newborn.^{5,6} This stimulated interest in pregnant women and newborn infants appears to have decreased perinatal wastage when individual specialized care has been instituted.

This paper concerns the problems in caring for pregnant women and their offspring. Some of the potential areas in the care of obstetric patients are reviewed in which early recognition and expedient management can provide the best chance of survival for the newborn infant—management that can be provided by teamwork involving obstetric-physician and pediatric-physician.

Most of us recall the time when the obstetric-physician delivered a baby and, when he noticed that the baby was ill, he would enlist the services of a pediatric-physician. Until recently the ability to manage the newborn was handicapped by a lack of new knowledge in the care of the newborn. Vital functions of the sick infant are now observed with sophisticated monitoring equipment; breathing can be assisted with continuous positive airway pressure respirators; and blood pH and oxygen saturation can be managed with greater skill. Some infants who previously were expected to die now live.⁶

The care of the newborn infant has become the

responsibility of an obstetric-pediatric team. The obstetric-physician attempts to anticipate the premature or sick infant and requests that a pediatric physician be present at delivery, who then can provide the necessary specialized care. When problems with the newborn are anticipated and special care facilities are not available immediately, arrangements can be made for the mother to deliver her baby in a location where specialized care is available, thus preventing any time delay between delivery and treatment of the newborn.

Most of the high-risk situations can be anticipated. The high-risk conditions can be categorized into those occurring: (1) during prenatal care and (2) during labor. Conditions that can be recognized during prenatal care which may generate high-risk infants at birth are Rh sensitization, diabetes mellitus, preeclampsia, maternal infections, "small-for-dates" babies, previous stillborn, twin pregnancy, and breech presentation. Conditions that can be recognized during labor which may deliver stressed infants are premature rupture of membranes, premature labor, prolonged labor, fetal distress (heart rate deceleration and meconium staining), third trimester bleeding, and malpresentations.

Each of these conditions can produce intrauterine death if the possibility of physiologic deterioration is not observed both during pregnancy and while the mother is in labor. And each of these conditions holds the latent hazards of prematurity, sepsis, and physiologic stress for the infant or a combination of these conditions at the time of birth.

At the present time, institutions that staff high-risk pregnancy centers and infant intensive care units have several testing procedures available to help observe and manage the high-risk pregnancy patients on both outpatient and inpatient bases. Physicians in outlying communities may take advantage of these procedures by sending specimens to regional laboratory facilities or by referring the patient either for a specific test or for a battery of

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See editorial, page 773.

tests to help establish the status of the pregnant patient. These procedures include 24-hour urine estriol determination, amniocentesis for spectrophotometric analysis and maturity screening, intra-uterine transfusions, and ultrasound determinations, as well as consultation regarding other possible medical problems.

Depending on the patient's problem, the physician may manage the patient in the home community or refer her for high-risk pregnancy management if monitoring equipment during labor and the availability of an infant intensive care facility seem advisable.

The fetal heart rate monitor has introduced a new parameter to the care of the high-risk pregnant patient at term and during labor. The beat-to-beat observation of the fetal heart rate provides the best available record of the status of the fetus during labor.³ The fetal heart beats and the frequency and duration of contractions of patients with intact membranes can be observed by the use of, respectively, external ultrasound transducers and the tocodynamometer. This type of observation is of particular importance when a high-risk infant is recognized before the onset of labor.

If there is doubt that the fetus can tolerate the rigors of labor, this can be challenged by the use of an oxytocin infusion to determine whether decelerated heart-rate patterns develop with contractions. Positive evidence of fetal distress such as this indicates that delivery by cesarean section is advisable if labor is expected to be long or vaginal delivery traumatic.

When a high-risk patient is admitted in labor, the external monitoring equipment can be used until the membranes rupture or if rupture of the membranes is inadvisable. When membranes are ruptured, direct fetal monitoring can be obtained with the fetal scalp electrode and the intra-uterine pressure catheter. Because electric interference is almost totally eliminated with the direct monitoring equipment, it yields the most valid information. The intra-uterine pressure catheter not only detects the frequency and duration of contractions but also determines the strength of each contraction.

On occasion fetal distress becomes evident during labor either by fetal heart rate deceleration or by the presence of meconium staining. If delivery is not imminent, the extent of fetal distress can be determined by the sampling of fetal scalp blood.⁴ Examples of this management are illus-

trated in the following situations.

Rh Sensitization

The Rh-sensitized patient is observed for increasing antibody titers during pregnancy. If titers increase significantly, amniocentesis for spectrophotometric analysis of bilirubin is used to direct the management of the pregnancy. Arrangements for intra-uterine transfusion by a qualified obstetrician can be made when indicated.

Diabetes

The insulin-dependent diabetic patient is managed during the early months of pregnancy by the obstetric-physician and a diabetologist. Because of the higher risk of placental insufficiency causing intra-uterine death in the last trimester, 24-hour urine estriol determinations are begun at intervals from the 30th week of gestation. As long as the estriol levels increase progressively, the pregnancy is allowed to continue to near the 37th week of gestation. At that time, amniocentesis for a maturity screen, that is, creatinine level and the ratio of sphingomyelin to lecithin, are determined, and if these are at sufficient levels, the time for delivery can be planned.

Whether to deliver the baby by cesarean section or by induction of labor must be determined by the obstetric-physician, the decision being based on the estimated size of the fetus and whether the baby can tolerate the stress of labor. If induction of labor is chosen, fetal monitoring during labor should be planned.

At birth, the baby is kept warm and is transferred to the infant intensive care unit for observation of its vital functions and blood sugar levels.

Premature Infants

A common admission to the infant intensive care unit is the premature or underweight infant. The admission of such an infant may originate from mothers with preeclampsia or Rh sensitization; premature labor; premature rupture of the bag of waters; premature labor of women with viral infections, pyelonephritis, or septicemia; mothers with "small-for-dates" babies, and mothers of twins.

Some of these conditions can be suspected or recognized by the obstetrician before the onset of labor, and prenatal testing can be decided upon by both obstetric and pediatric physicians. Urine estriol levels can be obtained to survey the fetoplacental function in preeclampsia.

The use of the creatinine level and the ratio of sphingomyelin to lecithin in amniotic fluid for determination of the maturity level is beneficial for the pediatric-physician in anticipating respiratory problems of the small infant.

Ultrasound determinations can help locate the placental site and depict the equivalent size of the fetal skull in "small-for-dates" infants and twin pregnancies.

Infants who are already stressed by maternal diabetes, Rh sensitization, toxemia, prematurity, amnionitis, or intra-uterine malnutrition are likely to become exhausted, anoxic, and acidotic during labor. Fetal monitoring of these infants during labor is a valuable tool in recognizing the problems, allowing delivery prior to the tragedy of intrapartum death.

Prolonged Labor

Prolonged labor or labor without progress is another source of stressed infants at birth. Dysfunctional labor in the primigravida and dystocia

due to cephalopelvic disproportion or malpresentation in either the primigravida or the multigravida are the common causes of prolonged labor. Fetal monitoring during labor is essential in the management of these patients. Infants born of these mothers frequently need immediate resuscitation and close observation of oxygen saturation, glucose levels, and acid-base balance after delivery. If the obstetric-physician anticipates problems for the newborn and has pediatric specialized management available, immediate sequential treatment can be instituted and more babies can be saved.

Conclusion

Although all babies cannot be saved, utilizing present knowledge and techniques and decreasing time delays between obstetric management and pediatric care frequently help. To improve perinatal salvage, the obstetric-physician must anticipate high-risk infants and provide for adequate sequential obstetric-pediatric intensive care.

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Lewis Wannamaker, M.D.

Dr. Lewis Wannamaker, professor of pediatrics at the University of Minnesota, has received the Outstanding Civilian Service Medal from the Department of the Army for his work as Director of the Commission on Streptococcal and Staphylococcal Diseases, Armed Forces Epidemiological Board, and as a member of the Commission since 1955.

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Warnings: Patients with severe cardiac disease should be given this medication with caution.

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Editorials

The Family Physician

THE COMPARATIVE STUDY of rural and urban physicians in our state and region by faculty of the University of Minnesota Duluth* is to be commended. The identification of variables which clearly differentiate rural and urban family physicians may not be as important as how we implement educational programs to *encourage* and *capture the imagination* of the budding physician. The dire need and necessity to redistribute our physicians appropriately is essential to the health and welfare of our population in the state, region and nation. Applied medical education programs for undergraduate and graduate medical students is essential in developing confidence, poise, deportment, comfortableness and enjoyment in delivering health and disease care to the rural popu-

lace. The Rural Physician Associate Program† at the University of Minnesota Medical School confirms much of what the Duluth faculty are identifying. The program also provides the seed-bed and instrument to allow future physicians the opportunity to experience and understand the nature of life in a small community which the authors believe may be most essential to selection and socialization of medical students for rural practice. Attitudes, skills, and knowledge being equal among our medical students, citizens, and patients—the essential ingredient will be *applying* what we already know about our people and professionals. Exploring *ways to effectively implement* rural medical educational programs for the undifferentiated medical student is essential to continue supplying the rural areas of our state and region with practicing physicians.

John Verby, M.D.
Minneapolis, Minnesota

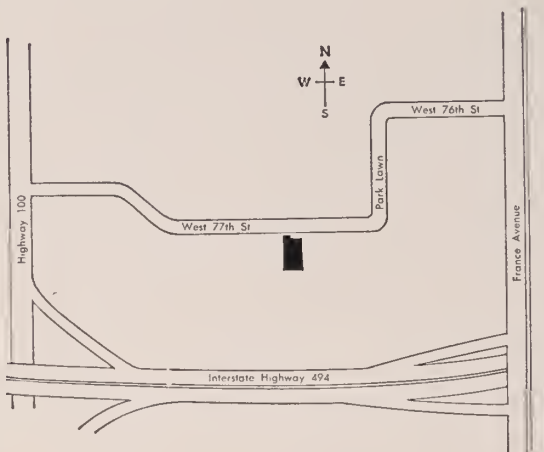
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†The Rural Physician Associate Program, University of Minnesota Medical School, Director John Verby, M.D., Professor, Dept. of Family Practice and Community Health, Joe Connolly, M.D., Associate Professor. Journal of Medical Education, 47, 907-908, November, 1972.

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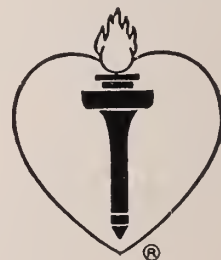


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Problems of Oral Irradiation

ONE COMPLAINT almost all patients treated for head and neck cancer* have in common is the severe dryness of their mouth. This is something that begins during their treatment course or subsequent to their surgery and continues on almost indefinitely.

With the advent of super-voltage radiation therapy equipment and advances in surgery and anesthesia, a much higher cure rate has been offered to these patients now with head and neck malignancies.

Until recent years, it was an accepted fact that people who were to receive irradiation to the head and neck area must have their teeth extracted prior to irradiation. By close cooperation with the dental sciences and the medical sciences, doctors have now learned that this is not necessary and that many patients can save most of their

teeth provided proper precautions are taken. Thorough evaluation of the teeth prior to treatment, as well as close follow-up of dental care and instruction to the patient on proper dental care after treatment, has made living a little more enjoyable for the fortunate ones who have been cured of their malignancy.

The incidence of osteoradionecrosis has decreased considerably in spite of the fact that much higher doses of irradiation are now given to achieve a higher incidence of cure.

What we do see now is extensive caries formation starting within a few months after completion of irradiation therapy and extending on throughout the lifetime of these patients. Good dental hygiene and adequate dental care have considerably improved the oral health problem of these patients.

John C. Kelly, M.D.
Minneapolis, Minnesota

*Broude, D. J. et al.: Oral Care in Radiation Therapy. *Minnesota Med* 56:581, 1973.

Steroid Induced Mediastinal Lipomatosis*

CENTRAL FAT, or centripetal fat deposition, after exposure to excessive endogenous and exogenous corticosteroids is dramatic. It results in some of the well known and classical visible features of Cushing's syndrome, "moon facies," "buffalo hump" and episternal or "dew lap tumor." Less well known, deep seated, and much less common sites are interesting variations: mediastinal widening, epicardial fat pads, pleural and paravertebral tissue thickening, identified as lipomatosis.

The exogenous source of the hormone is an obvious explanation of this manifestation which is apparently reversible when the hormone is discontinued.

The endogenous form is more subtle and chal-

lenging. Spontaneous Cushing's syndrome can be due to bilateral adrenal hyperplasia, resulting in mediastinal fat deposits, but is exceedingly rare. Surgical removal again results in the complete resolution of the process. Even more fascinating, it has been shown that certain non-endocrine tumors are also capable of producing hormones which can stimulate the adrenal cortex. This has been described as an ectopic ACTH syndrome. These tumors form peptides which have corticotropin releasing factor activity. One source of this has been demonstrated in small cell tumors of the lung. It would be important, therefore, to differentiate the more benign lipomatous change produced by Cushing's syndrome with that of this unusual tumor.

E. F. Englund, M.D.
Minneapolis, Minnesota

*Chong, G. C. et al.: Steroid-Induced Mediastinal Lipomatosis. *Minnesota Med* 56:597, 1973.

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Complications of Diverticulitis

BIZARRE PRESENTATION of common disease is a frequently recurring theme in the acute abdomen. A colleague tells the story of a year long contest amongst house officers to see who was most often correct in the diagnosis of the acute abdomen. Naturally, the man who picked appendicitis, regardless of the presenting symptoms or findings, came out ahead. Had the other house officers been more aware of the many faces of diverticulitis and appendicitis, the outcome might have been different. In this issue, Suros and Lec present an

interesting and unusual concurrence of complications of diverticulitis. i.e. Pneumoretroperitoneum, pneumomediastinum and subcutaneous emphysema.*

It would be well to recall that more common but still unusual presentations of diverticulitis include fever of unknown origin, rectal bleeding, mass, passage of gas and feces in the urine or frank peritonitis. Suros and Lee's description nicely documents another of the many possible faces of diverticulitis.

J. N. Mork, M.D.
Worthington, Minnesota

*See page 747.

Parkinsonism Disease

WHEN PARKINSONIAN PATIENTS, and families, and their physicians are eagerly awaiting the official release and marketing of the peripheral dopa decarboxylase inhibitors, we are fortunate to have Dr. Tolosa's* review article on The Modern Treatment of Parkinson's Disease.

As of this writing, there is still no release date for the decarboxylase inhibitors. Although they are expected to offer significant improvement to the use of L-Dopa, current reports indicate that there will still be frequent shortcomings in terms of efficacy and side effects to the combined L-Dopa-decarboxylase inhibitor therapy.

In the first wave of enthusiasm over L-Dopa, little attention or credit was given to prior and

other pharmacologic programs for Parkinsonism. It is becoming more apparent that many patients with Parkinsonism need more than L-Dopa for optimal symptomatic relief. It is expected that a similar need will exist with the L-Dopa-decarboxylase inhibitor combination. It is appropriate to review the total pharmacologic approach to Parkinsonism, as Dr. Tolosa has done, and to have our patients on optimal programs while we await the dopa decarboxylase inhibitors.

Although Dr. Tolosa has necessarily introduced us to some of the burgeoning lore and speculation regarding central neuro-transmitter substances and mechanisms, hopefully this will not 'turn off' the average practitioner from the practical side of this review.

Thomas W. Wilson, Jr., M.D.
Minneapolis, Minnesota

*Tolosa Eduardo: Parkinson's disease. Minnesota Med 56:6497, 1973.

Philosophical Musings of a Surgeon

Distorted, eschewed, unreliable figures, expressed by a famous name, are too often repeated as a reliable truth.

Carl O. Rice, M.D.
Editor Emeritus

Sequential Obstetric-Pediatric Intensive Care

THE ARTICLE OF Dr. Sheldon,* emphasizes the importance of intensive care obstetrics and the need for good communication with the pediatrician involved in any case.

The real need is for a cooperative program of care in obstetrics and pediatrics with the help of internal medicine in cases of maternal disease. At the present we are now out of the "quantity" obstetrics era and into the "quality" obstetrics era. It is important that potential high risk obstetric cases be handled by interested, capable obstetricians with delivery scheduled for a hospital which offers intrapartum fetal monitoring and intensive care neonatal nursing.

The article entitled "Antepartum Identification of the Fetus at Risk," by Goodwin, Dunne and Thomas¹ gave a good list of patients with a relative

high risk who should be cared for in a setting where high risk obstetric-neonatal intensive care can be given.

Currently, there is a move to consolidate the high risk obstetrics to certain centers throughout the state in order to achieve better care for these cases.

Rather than be forced to refer certain cases to certain centers, all physicians caring for obstetric patients should select those obstetric patients who are at risk. These patients should be referred to obstetricians who utilize existing hospitals that offer intensive care obstetric and pediatric care.

There is no doubt that teamwork is the key to better results as suggested by Dr. Sheldon.

Peter E. Fehr, M.D.
Minneapolis, Minnesota

*See page 762.

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Cadaver Organ Retrieval

IN THIS ISSUE Dr. Moberg et al.* perform a valuable service for patients in end stage renal failure, on dialysis, in again calling attention to the pressing need for cadaver organs. Their criteria for brain death are those largely followed on the national scene. In my opinion, the third criterion—"absence of brain stem reflexes" followed by a list of specific reflexes can be simplified simply to absence of all reflexes."

They suggest also the formation of a local liaison team for organ procurement, including internist, nephrologist, surgeon, neurosurgeon, neurologist and paramedical personnel such as hospital chaplain, charge nurse, etc. While this would be ideal, there are many hospitals from which cadaver organs might be procured, where some of the listed specialties are not represented. Furthermore, to assemble such a group on the occasion of cadaver availability would almost certainly be practically unworkable. In addition, the use of a transplant center-based organ procurement team, while ad-

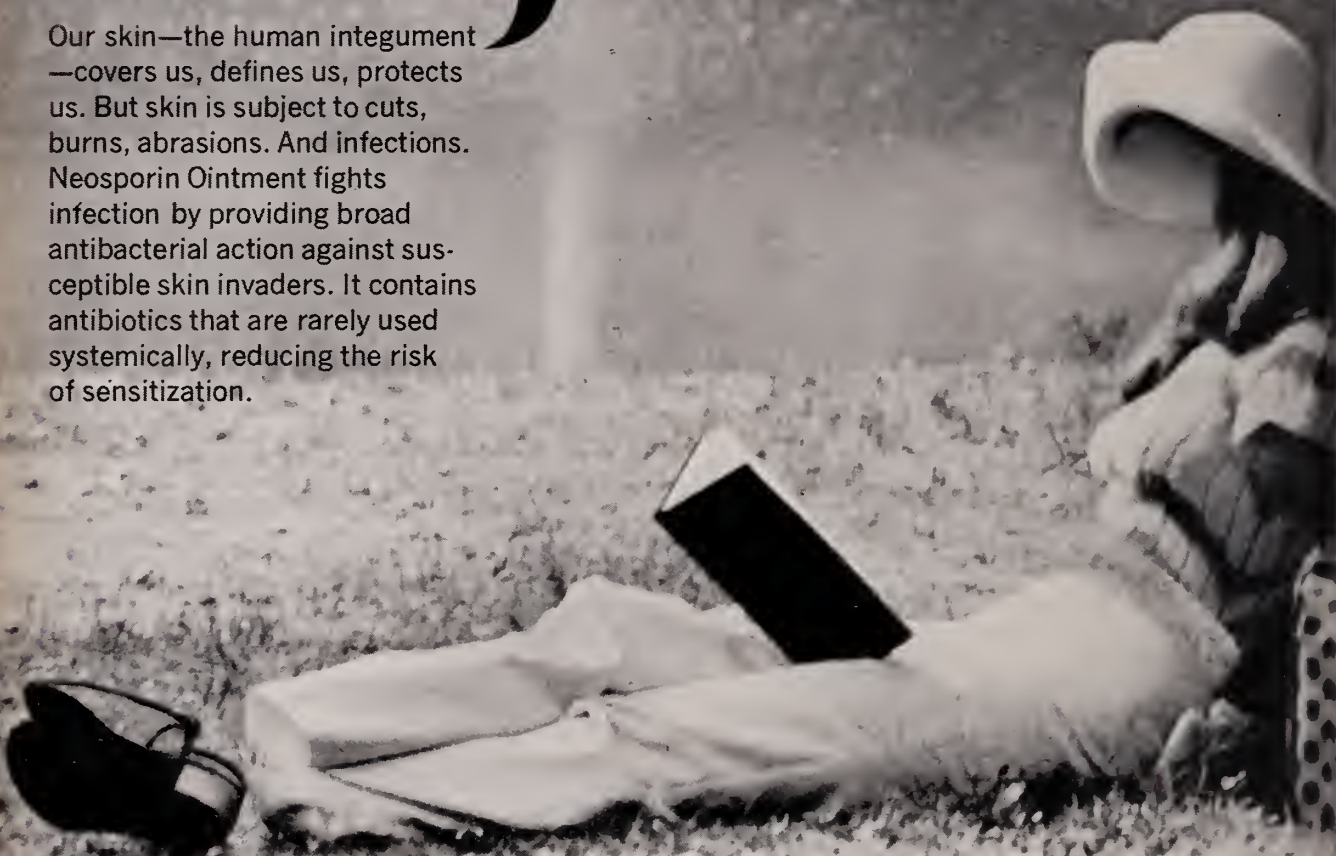
vantageous in some respects, has obvious disadvantages as well.

A reasonable and workable alternative, already in operation in Minnesota as advocated by the Medical Advisory Board of the Upper Midwest Kidney Foundation, is the training of surgeons (general or urological) in the technique of organ retrieval and simple preservation by irrigation with transportation in saline slush to the appropriate transplant center. There are funds currently available for the training of such surgeons (on a one or two day basis) from the Kidney Foundation. A surgeon so trained then may take the initiative at his own local hospital in assuring the use of suitable organs. Certification of brain death by two physicians other than the surgeon is acceptable and practical. It is current practice to reimburse the hospital for all expense involved in organ procurement and to pay the surgeon a reasonable fee for his services in procuring and shipping the organs. This arrangement has already worked successfully where tried.

*See page 797.

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PRECAUTION: As with other antibiotic preparations, prolonged use may result in overgrowth of nonsusceptible organisms and/or fungi. Appropriate measures should be taken if this occurs. Articles in the current medical literature indicate an increase in the prevalence of persons allergic to neomycin. The possibility of such a reaction should be borne in mind.

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John E. Woods, M.D.
Rochester, Minnesota

Transfemoral Brachiocephalic Angiography

IN THESE TIMES of radiologic enthusiasm for angiographic visualization of the vascular system, it is comforting to find scientists of repute who examine and report their results dispassionately, logically, and thoroughly. In their manuscript: "The Aortocranial Vessels: The Transfemoral Approach—Analysis of Results and Complications," Talberth and Gold* have rendered a service to the medical community by reminding us that the procedures are not completely innocuous. Good patient care demands that the benefits of our ministrations outweigh the hazards and it behooves us all to examine our practices with that in mind continually.

The present analysis reveals that neurologic complications of transfemoral brachiocephalic angiography are of about the same magnitude as those experienced with direct carotid puncture angiography. In addition, femoral complications were encountered in 8% of the patients including a 2% incidence of thrombosis of the femoral artery which required surgical measures for correction. It is of interest that these latter episodes

occurred in relatively young patients rather than, as might be expected, in the older atherosclerotic age groups. The "hypnotic effects" of catheter angiography (which leads one to persist too long in pursuit of success) touches all of us. The authors point out that many of their less than satisfactory results came after "prolonged studies with considerable manipulation of the catheter."

One can only agree wholeheartedly with the "Indications for Transfemoral Approach" listed in Table 5 as well as the "relative contraindications" detailed in the text. We should take particular note of the fact that only 20.4% of the authors' cerebral angiographic procedures are completed by the femoral route. This figure is low, possibly by a factor of 2 to 3, but it serves to emphasize the continuing need for skill in the techniques of percutaneous puncture of the carotid artery among neuroradiologists.

The lessons in this manuscript are many and the wisdom can be grasped by all who will not ignore it.

Hillier L. Baker, Jr., M.D.
Department of Radiology
Mayo Clinic

*See page 753.

The Poet's Blood,

That ever beat in mystic sympathy
With nature's ebb and flow, grew feebler still:
And when two lessening points of light alone
Gleamed through the darkness, the alternate gasp
Of his faint respiration scarce did stir
The stagnate night:—till the minutest ray
Was quenched, the pulse yet lingered in his heart.*

*Percy Bysshe Shelley: *Alastor*, 11:651, 1816.

Rural Physicians Associate Program 1971-1972

Crosby, Minnesota

MICHAEL R. SENTA

I REMEMBER how overwhelmed and frightened I was on my first day of the Rural Physicians Associate Program, a Saturday on call, and I remember handling those summer tourist weekends at the end of my year without much trouble at all. Quite a transition took place in my year in Crosby.

Crosby and Dr. Clark Marshall had taken senior medical students for the three summers previous to the Physicians Associate Program, and for that reason they expected too much of me at the beginning of my year, but eventually this was overcome. The first four and a half months were spent in the hospital, as an acting intern, doing histories and physicals on all hospital admissions, writing orders, and on call every third night. In this way I obtained an excellent start in primary care and its responsibilities. I developed a professional relationship with all five doctors which matured over the year so that I could take a night of call usually without bothering the doctor backing me up.

I delivered about 80 babies and assisted on many more. My year was skewed toward surgery. I was involved in the pinning of four hips and some hemorrhoidectomies, herniotomies, vein strippings, appendectomies, D&Cs, T&As, local excisions and some closed orthopedic reductions so I feel confident that I can do those procedures myself. I was first or second assistant on an additional 250-300 surgical procedures. I don't think anyone else in the program had that much surgical exposure. Maybe no one in medical school has ever had that much surgical exposure as a medical student. I learned how to do circumcisions, bone marrow aspirations, lumbar punctures, paracenteses and how to apply casts. I was more than satisfied with the extent of medical skills which I learned while there.

In January I started to work regular hours in the clinic every afternoon. With hospital patients and emergency room returnees as a basis, I gradually developed a full practice, seeing someone every half hour. This soon became every 15 min-

utes, and by early summer I was seeing as many patients as the other doctors, and as quickly. Here too, there were some days I would not have to bother any of the doctors with questions or problems. I had regular patients, and families for up to eight months.

The changes I saw in myself were retrospective and involved my attitude toward the art of medicine. I got irritated and frustrated. I laughed and cried and sometimes raised a little hell. I made medicine fun. It took perhaps six or seven months before I became comfortable and confident.

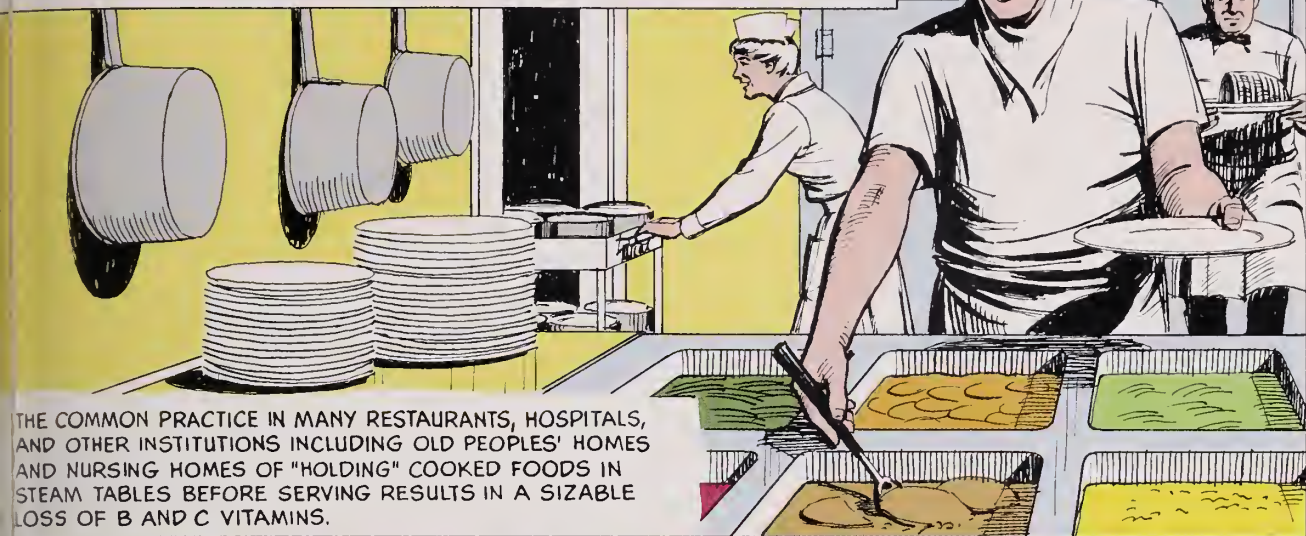
In reviewing the goals and objectives of the Physicians Associate Program, I think that I fulfilled them. I am proud of Crosby and its five doctors for that reason.

Dr. Walter Sosey was quick to anger, sometimes very slow to give encouragement, but bold, aggressive, and intelligent. Marshall was totally impressive. I worked very hard during the year, and was glad that I had no family which would have demanded time from me. I was happy that I could forego many of my usual outside interests. I feel that only certain personalities could have "survived" a year in Crosby. The program demanded much more time and concentration than a year at Medical School.

Socially I didn't suffer. Walt Sosey, his wife and the surgical scrub nurse and her husband became good friends. They will stay so. I bought a snowmobile. Sosey bought a 750cc Honda so he could keep up with my 750cc B.M.W.

I feel very close to Crosby now. I've been back every three or four weeks since I left. It seems I know every fourth or fifth person on the street downtown. When I left, there were parties and dinners and some embarrassing plaudits. The town did a lot for me as far as teaching me medicine and attitudes concerning people, particularly sick people. It was a satisfying year professionally and emotionally. I think I can be liked and respected and I know I can do the job wherever I wind up, which will very probably be a small town somewhere.

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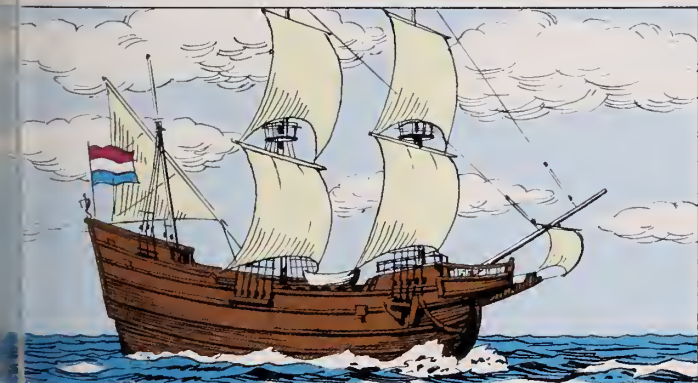
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THE AMOUNT OF SUNLIGHT AVAILABLE DURING RIPENING DETERMINES TO A LARGE EXTENT THE FINAL ASCORBIC ACID CONTENT OF TOMATOES. HENCE, A COOL, WET SUMMER PRODUCES WATERY, LESS TASTY FRUIT THAT'S LOWER IN VITAMIN C.

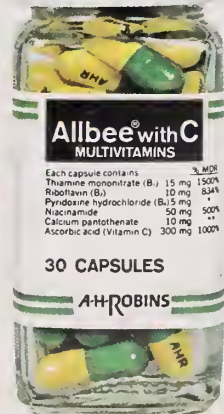


HNSSSENS, A DUTCH PHYSICIAN, WROTE IN 1564 THAT "DUTCH SAILORS WHO, RETURNING FROM SPAIN, WERE ATTRACTED BY THE NOVEL RICHNESS OF THE FRUIT (ORANGES) AND BY THEIR GREED AND GLUTTONY, UNEXPECTEDLY DROVE OUT THE DISEASE (SCURVY), AND HAD THIS HAPPY EXPERIENCE NOT ON A SINGLE OCCASION ONLY, BUT REPEATEDLY."

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phenobarbital	($\frac{1}{4}$ gr.) 16.2 mg	($\frac{1}{2}$ gr.) 32.4 mg	($\frac{3}{4}$ gr.) 48.6 mg
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Radioimmunoassay of Circulating Carcinoembryonic Antigen

in Cancer Patients

H. J. SMITH, PH.D.,* P. H. FIGARD, PH.D.,* and M. GÖKCEN, M.D., PH.D.*

CANCER SPECIFIC antigens are of considerable interest because of their importance in the development of immunological methods for the detection, diagnosis, and treatment of cancer. It is only recently that the occurrence of cancer specific

antigens in human cancer has become well established and has led to a surge of interest in the clinical application of tumor immunology.

In 1965 Gold and Freedman¹ reported the identification of a cancer specific antigen in colon cancer. As this antigen was also found to be present in embryonic intestinal tissue it was termed

*Research and Education Division of Health Central Inc., and Life Sciences Foundation, 4101 Golden Valley Road, Minneapolis, Minnesota 55422.

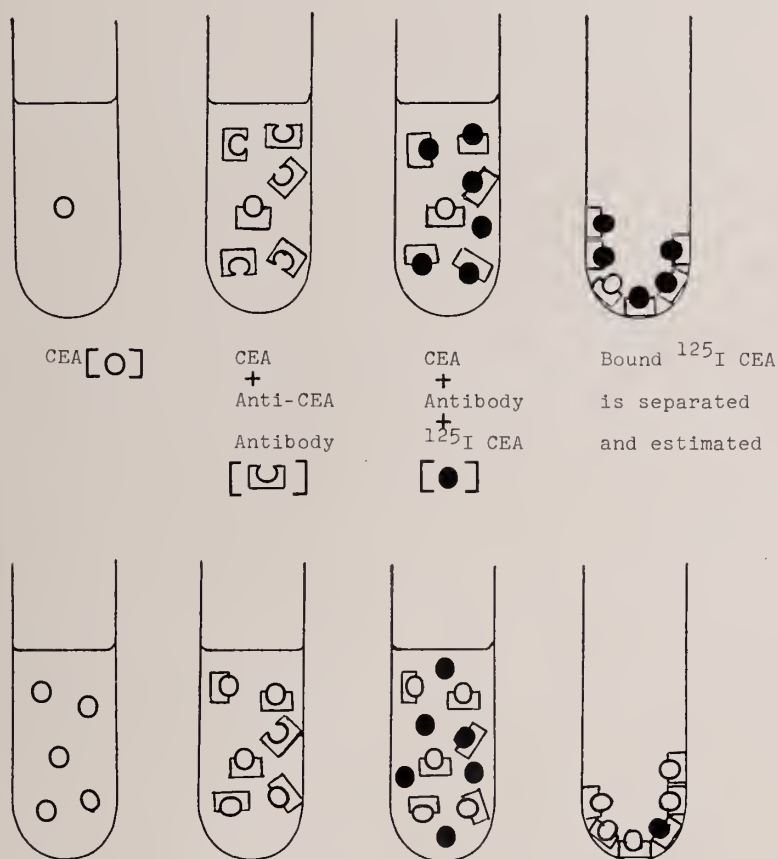


Fig. 1—Radioimmunoassay test for CEA.

Top Row. The small amount of CEA present occupies few antibody sites. Most of the antibody sites are still free to bind ¹²⁵I CEA. The percent of ¹²⁵I CEA bound is therefore large (high level of radioactivity in the precipitate).

Bottom Row. The large amount of CEA present occupies most of the antibody sites. Few of the antibody sites are free to bind the ¹²⁵I CEA. The percent of ¹²⁵I CEA bound is therefore small (low level of radioactivity in the precipitate).

the 'Carcinoembryonic Antigen' (CEA). CEA was purified² and characterized as a protein-polysaccharide complex.³ A radioimmunoassay test for measuring CEA levels in serum was developed by Thomson et al.,⁴ who observed that patients with colon cancer had elevated levels of circulating CEA. Radioimmunoassay tests for CEA are under intensive investigation to determine their potential diagnostic value.⁵⁻⁸

Radioimmunoassay Test for CEA

The principle of the radioimmunoassay test depends upon the competitive binding between the CEA present in the test sample and radioactively labelled CEA (^{125}I CEA) for a limited amount of anti-CEA antibody. The test is illustrated schematically in Figure 1. The absence of CEA in the test sample allows a major fraction of the ^{125}I CEA to bind to the antibody. The presence of CEA in the test sample, however, inhibits the binding of ^{125}I CEA by competing for the available antibody sites. With increasing amounts of CEA present in the test sample there is a progressive decrease in the amount of ^{125}I CEA bound. By using known standardized amounts of CEA an inhibition curve for the standards can be prepared (Figure 2). The CEA content of an unknown sample can now be estimated by determining the percent inhibition given by the sample and comparing it to the standard inhibition curve. The results are expressed in nanograms of CEA per ml of serum or plasma (ng./ml. CEA).

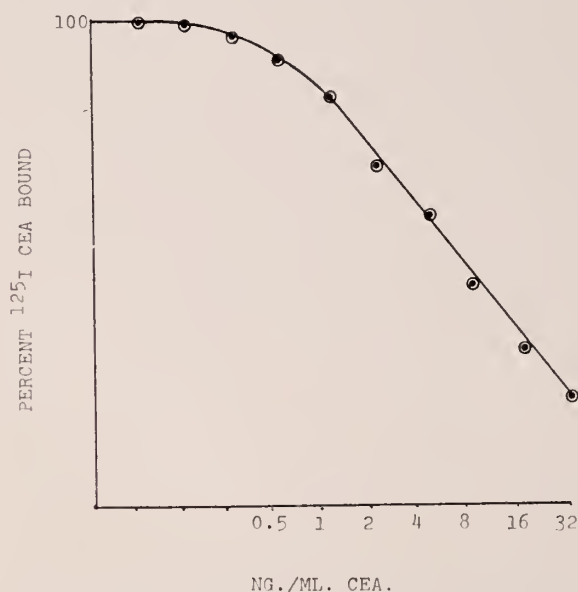


Fig. 2—Radioimmunoassay test for CEA. Standard Inhibition Curve.

We have developed a sensitive radioimmunoassay test for CEA⁹ in our laboratories using highly purified CEA and ¹²⁵I CEA preparations, and monospecific rabbit anti-CEA antiserum. The sensitivity of the test allows us to measure the CEA content in 1 ml. samples of either serum or plasma, within a working range of 0.5 to 32 ng./ml. CEA. We are using this radioimmunoassay procedure to investigate the level of circulating CEA in patients with a variety of cancers, and in screening normal individuals.

Results

The results we have obtained to date of CEA levels in healthy persons and in patients with different cancers are given in Table 1.

TABLE 1
Circulating CEA Levels in Patients with Different
Cancers. The Normal Range was determined for
33 Healthy Persons.

Melan Cancer	Malignant Melanoma	Breast Cancer	Ovarian Cancer	Cancer Cecum	Chronic Myelogenous Leukemia	Multifocal Myeloma
• • • • •	• • • • • • •	•	•	•	•	• •
• • •	• • •	• •				

Normal Individuals

We observed that 33 normal healthy persons had circulating CEA levels that ranged from 0 to 1.3 ng./ml. CEA. We consider CEA levels above 1.3 ng./ml. to be abnormal. The 0 to 1.3 ng./ml. CEA range reported here is comparable to the 0 to 2.5 ng./ml. range observed by others,⁴⁻⁸ as the CEA preparations used in our assay are approximately twice as active antigenically as other CEA preparations.

Patients with Colon Cancer

Ten patients with colon cancer were found to show a range of circulating CEA levels from 0.3 to 35 ng./ml. CEA, with eight patients having abnormal CEA levels. All eight patients with elevated CEA levels also had known metastatic cancer, while the two patients with low levels after surgery were apparently free of tumor. Our observations are in accord with those reported by

Thomson et al.,⁴ and Dhar et al.⁸

CEA in Colonic Cancer

Case 1. A 50-year-old man underwent surgery for cancer of the colon. There were extensive abdominal metastases with infiltration of the kidneys and liver. The preoperative serum sample was 24 ng./ml. CEA. The postoperative serum sample taken three months after surgery showed the same level.

Case 2. A 57-year-old man with cancer of the colon had a partial gastrectomy and a resection of his tumor. Active immunization of the patient to his tumor was initiated for a period of six months following surgery. Two years later there is no obvious tumor recurrence and the CEA level in the patient's serum is 1.0 ng./ml.

Patients with Malignant Melanoma

The radioimmunoassay tests for CEA in patients with malignant melanoma showed a range of circulating CEA levels from 0 to 10 ng./ml. CEA. Eleven of the 10 melanoma patients had levels above normal. We are unable to find any reports in the literature of elevated CEA levels in malignant melanoma. Six melanoma patients with abnormal CEA levels also had known metastases. A patient with localized tumor that was surgically removed showed a postoperative elevated CEA. In contrast, three patients with low CEA were apparently free of tumor since surgery several years previously.

CEA in Malignant Melanoma

Case 1. A 66-year-old man had a malignant melanoma resected from the left shoulder. Five years later a recurrent melanoma was removed, and a radical axillary dissection performed. Active immunization of the patient to his tumor was then initiated for a period of 1.5 years following surgery. Two years later the patient presented with recurrent tumor and surgery revealed extensive abdominal metastases. Serum samples taken at various intervals during the course of the disease showed a persistent elevated CEA with a current level of 10 ng./ml.

Case 2. A 46-year-old woman had surgical removal of malignant melanoma of the left leg. One year later a recurrent cancer in the same area was removed with dissection of the left groin area. The following year she was again operated upon for tumor recurrence in the same area. Active immunization of the patient to her neoplasm was then initiated for a period of two years at which time the patient's CEA level was 0 ng./ml.

Case 3. A 52-year-old male had removal of a malignant melanoma of the left forearm. The postoperative serum sample taken one month after surgery showed an elevated CEA level of 4.5 ng./ml.

CEA in Miscellaneous Cancers

Preliminary results showed that patients with malignancy of the breast, ovary, cecum or with chronic myelogenous leukemia may also have elevated CEA. The results are in accord with the accumulating reports that patients with different cancers may have elevated CEA levels. Lo Gerfo

et al.⁵ and Reynoso et al.⁷ have reported increased CEA in patients with carcinoma of the gastrointestinal tract, breast, or of the genitourinary system. The various reports of the incidence of abnormal CEA levels in patients with different cancers are collated in Table 2,

TABLE 2
Incidence of Elevated CEA Levels in
Patients with Different Cancers.
CEA Levels in Cancer Patients

Very frequently elevated in :-

(incidence of 75-100%)

Pancreatic cancer

Colon cancer

Frequently elevated in :-

(incidence of 50-75%)

Gastric cancer

Gall bladder cancer

Hepatoma

Lung cancer

Metastatic breast cancer

Neuroblastoma

Osteogenic sarcoma

Malignant Melanoma

Sometimes elevated in :-

(incidence of 25-50%)

Cervical cancer

Ovarian cancer

Prostatic cancer

Bladder cancer

Renal cancer

Localized breast cancer

Misc. cancers

Discussion

It can be seen that in addition to patients with colon carcinoma, elevated CEA levels may also be found in patients with cancers at other sites. The CEA test cannot by itself be considered to be diagnostic for colon cancer, but may be of some diagnostic value when used in conjunction with other clinical tests.

Circulating CEA levels have been found to be useful in the staging of malignant tumors. Dhar et al.⁸ and Kleinman and Turner⁶ have reported that colon cancer patients with localized tumors had a low incidence of abnormal CEA levels while all patients with metastatic cancer had high levels. The results reported here are in agreement. Our observation that melanoma patients with localized tumor usually had normal CEA while those with metastases had elevated levels, suggests that the CEA test could also be used in staging of malignant melanoma. A similar suggestion for staging of breast cancer has been put forward by Reynoso et al.⁷

The measurement of CEA before and after treatment has also been found to be of value in

determining the success of therapy, and in monitoring the subsequent course of the disease. Thomson et al.⁴ and Dhar et al.⁸ have observed that CEA levels in colon cancer patients would often fall after surgical removal of the tumor. A persistent high CEA level postoperatively may indicate the presence of residual tumor.⁸ A fall in CEA followed by a subsequent rise may indicate tumor regrowth.⁸ Reynoso et al.⁷ found that children with neuroblastoma had elevated CEA levels, but that these fell to within the normal range when the cancer was in remission.

Patients with certain non-malignant diseases may also have elevated CEA levels. Lo Gerfo et

al.⁵ have reported increased CEA levels in 32% of patients with ulcerative colitis, and in 11% of patients with pulmonary disease. Moore et al.¹ found 45% alcoholic patients with liver disease had raised CEA levels. In most instances however it is possible to determine the conditions that affect the CEA level.

The examples discussed in this report illustrate the value of determination of CEA levels in the detection, treatment, and prognosis of cancer.

Acknowledgments

We wish to thank Dr. F. Ankner and Dr. C. Everhart for supplying tissue specimens and serum samples, and P. J. O'Neill for her helpful criticism of this paper.

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Meetings

October 21—Minnesota Society of Internal Medicine, Semiannual Meeting, 8 a.m.
Program Chairman: David Dines, M.D. Mayo Clinic, Rochester, Minn. 55901.

Mann Hall, Medical Science Bldg., Rochester.

October 29-31 and November 5-7—Clinical Reviews, Mayo Clinic & Mayo Foundation, Identical Sessions. \$50 registration fee. Write Postgraduate Courses, Mayo Clinic-Mayo Foundation, Rochester, Minn. 55901.

November 9—Minnesota Dermatological Society, Quarterly Clinical Meeting, St. Paul-Ramsey Hospital, St. Paul, Program Chairman: Bruce Bart, M.D.

Metastatic Testicular Neoplasm to the Kidney

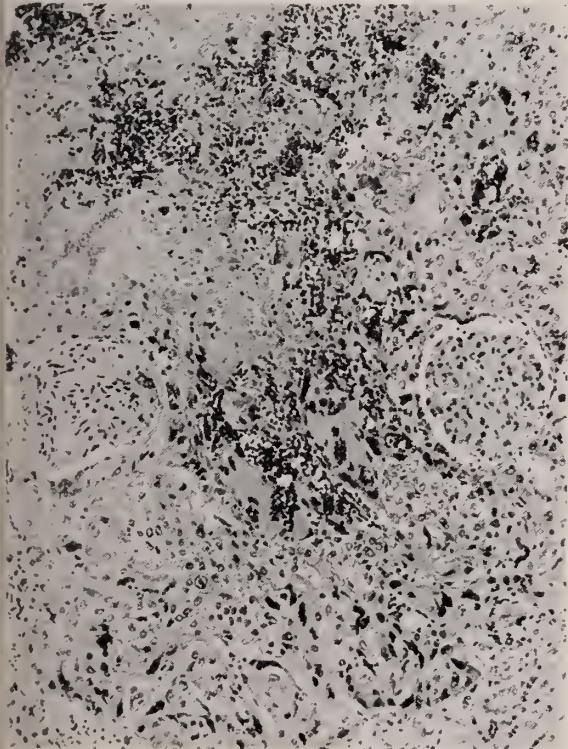
WILLIAM DeWOLF, M.D.* and ELWIN E. FRALEY, M.D.†

NEOPLASMS METASTATIC to the kidney are not uncommon and are found in 8% of patient's dying from malignant disease.¹ It is unusual for a metastases to present as a solitary renal mass, and to cause urinary tract symptoms. This is a case report of a patient with a mixed testicular tumor, metastatic to the kidney presenting with hematuria.

Case Report

A 29-year-old male was well until eight months prior to admission when he noticed that his right testicle was hard.

*Resident in Urology, University of Minnesota, Minneapolis.
†Professor and Chairman, Division of Urology, Department of Surgery, University of Minnesota, Minneapolis.



Figure—Microscopic section of kidney demonstrating metastatic foci of embryonal cell carcinoma and choriocarcinoma.

Subsequent inguinal orchiectomy showed an embryonal testicular carcinoma with elements of seminoma and choriocarcinoma. Soon thereafter the patient had metastases in the lungs and abdominal lymph nodes, and was treated with radiotherapy, vinblastine sulfate (Velban), bleomycin, cyclophosphamide (Cytosan) and dexamethasone (Decadron) at various intervals. Three months later the patient was readmitted for evaluation of gross hematuria. Hematologic studies showed a platelet count of 45,000/mm.² Intravenous pyelogram showed a mass in the lower pole of the left kidney. After a platelet infusion the bleeding stopped. Several weeks later the patient died. Pathological examination of the left kidney revealed several foci of metastatic tumor, the largest 3 cm in diameter, hemorrhagic and composed of chorionic and embryonal elements (Figure).

Discussion

Metastatic disease to the kidney is more than twice as common as primary lesions.² The kidney ranks fifth as a site of metastases after lung, liver, bones and adrenals.³ Primary tumors of the breast and lung are the most common tumors to metastasize to the kidney.⁴ While testicular neoplasms have been shown to produce microscopic foci of metastases in the kidney, they rarely become massive causing hematuria. This is probably because the patient does not live long enough for symptoms to develop.

Treatment for such a problem is symptomatic, and surgery is reserved for uncontrolled sepsis, pain or bleeding.

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Recommendations[†] on Combination Live Virus Vaccines

American Academy of Pediatrics

Committee on Infectious Diseases

In the September 15, 1971 AAP Newsletter sent to Academy members, the Committee on Infectious Diseases of the American Academy of Pediatrics stated its recommendations on the use of combination live virus vaccines. After a careful review of available data, the committee concluded that:

- "This information indicates that the products are both safe and effective when used as directed."
- The vaccine "...can, therefore, be recommended with the obvious advantages of reduction in the number of injections for any given child and a concomitant decrease in the required visits to a physician's office or clinic."

[†]For complete text of both recommendations see your MSD representative or write to Professional Service Dept., Merck Sharp & Dohme, West Point, Pa. 19486.

United States Public Health Service

Advisory Committee on Immunization Practices

In the April 24, 1971 issue of *Morbidity and Mortality Weekly Report*, the Advisory Committee on Immunization Practices of the United States Public Health Service presented recommendations on the use of combination live virus vaccines. The committee stated that:

- "Data indicate that antibody response to each component of these combination vaccines is comparable with antibody response to the individual vaccines given separately."
- "There is no evidence that adverse reactions to the combination products occur more frequently or are more severe than known reactions to the individual vaccines (see pertinent ACIP recommendations)."
- "The obvious convenience of giving already selected antigens in combined form should encourage consideration of using these products when appropriate."



M-M-R^{*}

(MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE | MSD)

Single-dose vials

M-M-R, given in a single injection, fits easily into your routine immunization program for well babies. Given at age 12 months, M-M-R provides for vaccination early in life against measles, mumps, and rubella.

MSD suggested immunization schedule for well babies	
Age	Vaccine(s)
2 months	DPT (diphtheria-pertussis-tetanus) Oral poliomyelitis vaccine (triple)
3 months	DPT ¹
4 months	DPT Oral poliomyelitis vaccine (triple)
6 months	Oral poliomyelitis vaccine (triple)
12 MONTHS	M-M-R (MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE, MSD)

1. This vaccination may be given at 3 months, 5 months, or at 6 months, depending on your preference or on the condition of the child.
Since vaccination with a live virus vaccine may depress the results of a tuberculin test for four weeks or longer, the test and the vaccine should not be given during the same office visit.

^{*}Trademark of Merck & Co., Inc.

For a brief summary of prescribing information, please see following page.



M-M-R

(MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE | MSD)

Single-dose vials

No untoward reactions peculiar to the combination vaccine (M-M-R) have been reported.

Moderate fever (101-102.9 F) occurs occasionally. High fever (over 103 F) occurs less commonly. On rare occasions, children who develop fever may exhibit febrile convulsions. Rash (usually minimal and without generalized distribution) may occur infrequently.

Since clinical experience with measles, mumps, and rubella virus vaccines given individually indicates that very rarely encephalitis and other nervous system reactions have occurred, such reactions may also occur with M-M-R. A cause and effect relationship, however,

has not been established.

Excretion of the live attenuated rubella virus from the throat has occurred in the majority of susceptible individuals administered the rubella vaccine. There is no definitive evidence to indicate that such virus is contagious to susceptible persons who are in contact with the vaccinated individuals. Consequently, transmission, while accepted as a theoretical possibility, has not been regarded as a significant risk.

Must not be given to women who are pregnant or who might become pregnant within three months following vaccination.

Contraindications: Pregnancy or possibility of pregnancy within three months following vaccination; infants less than one year old; sensitivity to chicken or duck, chicken or duck eggs or feathers, or neomycin; any febrile respiratory illness or other active febrile infection; active untreated tuberculosis; therapy with ACTH, corticosteroids, irradiation, alkylating agents, or antimetabolites; blood dyscrasias, leukemia, lymphomas of any type, or other malignant neoplasms affecting the bone marrow or lymphatic systems; gamma globulin deficiency, i.e., agammaglobulinemia, hypogammaglobulinemia, and dysgammaglobulinemia.

Precautions: Administer subcutaneously; do not give intravenously. Epinephrine should be available for immediate use should an anaphylactoid reaction occur. Should not be given less than one month before or after immunization with other live virus vaccines; vaccination should be deferred for at least six weeks following blood transfusions or administration of more than 0.02 cc immune serum globulin (human) per pound of body weight, or human plasma.

Due caution should be employed in children with a history of febrile convulsions, cerebral injury, or any other condition in which stress due to fever should be avoided. The physician should be alert to the temperature elevation which may occur after vaccination.

Excretion of the live attenuated rubella virus from the throat has occurred in the majority of susceptible individuals administered the rubella vaccine. There is no definitive evidence to indicate that such virus is contagious to susceptible persons who are in contact with the vaccinated individuals. Consequently, transmission, while accepted as a theoretical possibility, has not been regarded as a significant risk.

Attenuated live virus measles and mumps vaccines, given separately, may temporarily depress tuberculin skin sensitivity; therefore, if a tuberculin test is to be done, it should be scheduled before vaccination, to avoid the possibility of a false negative response.

Before reconstitution, refrigerate vaccine at 2-8 C (35.6-46.4 F) and protect from light. Use only diluent supplied to reconstitute vaccine. If not used immediately, return reconstituted vaccine to refrigerator at 2-8 C (35.6-46.4 F), and discard after eight hours.

Adverse Reactions: Fever, rash; mild local reactions such as erythema, induration, tenderness, regional lymphadenopathy; parotitis; thrombocytopenia or purpura; allergic reactions such as urticaria; arthritis, arthralgia, and polyneuritis.

Occasionally, moderate fever (101-102.9 F); less commonly, high fever (above 103 F); rarely, febrile convulsions.

Encephalitis and other nervous system reactions that have occurred very rarely with the individual vaccine may also occur with the combined vaccine.

Transient arthritis, arthralgia, and polyneuritis are features of natural rubella and vary in frequency and severity with age and sex, being greatest in adult females and least in prepubertal children. Such reactions have been reported with live attenuated rubella virus vaccines. Symptoms relating to joints (pain, swelling, stiffness, etc.) and to peripheral nerves (pain, numbness, tingling, etc.) occurring within approximately two months after immunization should be considered as possibly vaccine related. Symptoms have generally been mild and of no more than three day duration. The incidence in prepubertal children would appear to be less than 1% for reactions that would interfere with normal activity or necessitate medical attention.

How Supplied: Single-dose vials of lyophilized vaccine, containing when reconstituted not less than 1,000 TCID₅₀ (tissue culture infectious doses) of measles virus vaccine, live, attenuated, 5,000 TCID₅₀ of mumps virus vaccine, live, and 1,000 TCID₅₀ of rubella virus vaccine, live, expressed in terms of the assigned titer of the NIH Reference Measles, Mumps, and Rubella Viruses, and approximately 25 mcg neomycin with a disposable syringe containing diluent and fitted with a 25-gauge, 5/8" needle. Also in boxes of 10 single dose vials nested in a pop-out tray with a separate box of 10 diluent-containing syringes.

For more detailed information, consult your MSD representative or see full prescribing information. Merck Sharp & Dohme, Division of Merck & Co., Inc., West Point, Pa. 19486

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Fracture Conference

Puncture Wounds of the Foot

HAMLET A. PETERSON, M.D.*, HUBERT A. TRESSLER, M.D.†,
ALLEN G. LANG, M.D.† and EINER W. JOHNSON, JR., M.D.*

Dr. Hamlet A. Peterson:

This conference concerns puncture wounds of the foot, which occur frequently, particularly during the summer months. The patient usually is a child who comes to the emergency room with a puncture hole in the foot after having stepped on a nail or some other pointed object. Dr. Petty, what is your approach in this situation?

Dr. Roy W. Petty:

I would get the foot clean by having the patient soak it for 15 minutes and administer tetanus prophylaxis with either active immunization or a booster.

Dr. Peterson:

Would you have an Xray taken?

Dr. Petty:

Yes, if the patient had stepped on a rather large nail. But if the nail was small, and there was just a little prick in the skin, then I wouldn't.

Dr. Peterson:

The approach that Dr. Petty outlined is a rather standard one in treating a puncture wound of the foot. Some situations require more aggressive approaches, and to illustrate this, we are going to describe three cases.

Case 1

Dr. Hubert A. Tressler:

The first patient is a 13-year-old boy who sustained a puncture wound of the right foot on Aug. 20, 1971. A nail pierced the sole of his tennis shoe, through the foot,



Fig. 1 (Case 1)—(A) and (B). Osteomyelitis of right third toe nine months after puncture wound. (C) Right proximal phalanx of third toe after saucerization. (D) Proximal phalanx of right third toe eight months after saucerization.

and exited on the dorsum. The wound was in the plantar surface on the lateral aspect of the third proximal phalanx. The patient was treated initially with penicillin by his physician father. Five days later, the patient was sent to the emergency room for a tetanus booster. The wounds had closed, and no Xray was taken. The wound healed, and the patient was active and asymptomatic all winter. On May 24, 1972, nine months after injury, he returned complaining of swelling and pain in the third toe on his right foot. Dr. Monkman, would you comment on these Xrays (Figure 1A and B)?

Dr. George R. Monkman:

There is evidence of sclerosis at the base of the third proximal phalanx.

Dr. Peterson:

Would you comment on the epiphyseal growth plate?

Dr. Monkman:

The plate is apparently involved. It does not appear to be long enough.

Dr. Peterson:

Since it is now nine months after injury, what treatment should be carried out?

Dr. Monkman:

I think that the area should be opened and debrided and cultures taken.

Dr. Peterson:

What type of an approach would you use?

Dr. Monkman:

Possibly, a dorsal approach in one of the web spaces.

Dr. Tressler:

Ten months after injury, saucerization of the proximal phalanx of the right third toe was performed (Figure 1C). Gross pus was not encountered in the soft dead bone. Cultures were taken, and these revealed *Pseudomonas aeruginosa* and *Staphylococcus epidermidis*. The patient was given gentamicin, as dictated by sensitivity studies.

Dr. Peterson:

The complete center of the phalanx was removed, but the epiphyseal growth plate was not further damaged.

Dr. Monkman:

What was the dose and duration of gentamicin therapy?

Dr. Tressler:

Gentamicin was given intravenously in 40-mg doses, three times a day for nine days, and methicillin was given intravenously in 500-mg doses, four times a day for 12 days.

Do you think that this therapy was long enough?

Dr. Monkman:

Well, probably not. But the duration should depend on subsequent cultures.

Dr. Tressler:

The feeling was that the thorough surgical debridement was the primary treatment and that the use of antibiotics was secondary. The wound was too small to irrigate. Eight months after saucerization, the patient was asymptomatic (Figure 1D).

Dr. Monkman:

There is still some evidence of sclerosis in the proximal phalanx, and the epiphyseal plate is still abnormal. The cavity that we saw earlier has apparently healed.

Dr. Peterson:

The small, round lytic areas that were surrounded by sclerosis are no longer present (compare Figure 1A and B with D). There is a shortening of the phalanx and some angulation. There was more damage of the epiphysis on one side than on the other. Do you think that this injury is going to cause a later problem? The boy is still growing and is 13 years old now. He was 11 years old at the time of the injury.

Dr. Monkman:

This depends on how much growth he has left.

Dr. Peterson:

Dr. Linscheid, do you think that the injury would cause any difficulty?

Dr. Ronald L. Linscheid:

I suspect that he will tend to nestle down on the second toe.

Dr. Peterson:

Is any additional treatment necessary now?

Dr. Anthony J. Bianco, Jr.:

I wonder whether the joint might be involved later. Degenerative changes of the joint may occur but I doubt whether the position of the toe will change.

Dr. Peterson:

No more treatment is contemplated at the present time.

Case 2

Dr. Tressler:

The second patient is a 12-year-old boy who sustained a nail puncture wound on the plantar surface of the left foot eight months previously. The only initial treatment was a tetanus booster. The wound drained pus for three weeks and closed spontaneously. No cultures were taken. The wound has drained on two more occasions. The patient has soaked his foot and has taken antibiotics (types unknown). His main complaint on the first visit

PUNCTURE WOUNDS OF THE FOOT

was swelling and pain over the volar lateral aspect of the foot. The leukocyte count was 9,200/cu mm, and the sedimentation rate was 36 mm in one hour. Dr. Barron, will you comment on the Xrays (Figures 2A and B)?

Dr. Stephen E. Barron:

There is evidence of sclerosis on one of the tarsal bones. The boy probably has a low-grade osteomyelitis.

Dr. Peterson:

The sclerosis of the cuboid corresponds with the area of the puncture wound and the recurrent drainage.

Dr. Tressler:

What would you suggest be done now?

Dr. Barron:

I think I would get a culture of the drainage to see what you are dealing with. Cultures for fungus as well as bacteria should be taken.

Dr. Peterson:

It was not draining at that time.

Dr. Barron:

Then I think that one would have to go in and debride the apparent area of infection, and possibly close it over secondarily.

Dr. Tressler:

Surgical debridement was performed, and the wound was packed open for two days. Two days later, the cultures showed no growth. The wound was again cultured, further debrided, and closed with the boy under general anesthesia. The cultures subsequently grew *P. aeruginosa*, *Escherichia coli*, *Streptococcus*, *Fusobacterium necrophorum*, *Peptococcus*, and *Propionibacterium*. No antibiotics were given. The wound healed without incident. Six months later, the foot was asymptomatic and the sedimentation rate was 23 mm in one hour.



Fig. 2 (Case 2)—(A) and (B) Osteomyelitis of left cuboid eight months after puncture wound. (C) and (D), Left cuboid two and a half years after saucerization. Patient was asymptomatic.

The patient was last seen two and a half years after surgery, and he continued to be normally active and asymptomatic (Figures 2C and D).

Dr. Peterson:

At surgery, no pus or foreign material was found, but the cultures later were positive. The wound was packed open for two days and then was closed. No antibiotics were given at anytime. The boy has remained asymptomatic for two and a half years after this procedure, and looking at the Xray, I suppose that one would be hard pressed to state whether he is really over his problem or not. As long as he remains asymptomatic, I feel that no further treatment is indicated, although I don't think you could say with 100% assurance that there won't be a problem in the future.

Dr. Joe W. Crow:

Why wasn't he treated with antibiotics?

Dr. Peterson:

No antibiotics were given initially because no pus was encountered and the initial cultures were negative. Although the initial cultures subsequently grew organisms, the wound was closed by that time. In essence, it was felt that the surgical debridement, performed twice, was sufficient.

Case 3

Dr. Tressler:

The third patient was 17 years old when she was first seen in orthopedic consultation in July 1969. A nail had pierced her left foot in 1963, when she was 12 years old. Initial treatment consisted of a tetanus booster. Two years later (1965), incision and drainage of the third metatarsal were performed elsewhere. Cultures revealed *Proteus* organisms, and antibiotics were given. The wound required dressing changes and soaks, and healed three months later. Intermittent pain and swelling did not limit her activities, but these gradually became worse during the subsequent four years.

When first seen at our clinic in 1969, the girl had mild swelling and tenderness over the second and third metatarsals. The roentgenogram (Figure 3A) showed

evidence of sclerosis and a deformity of the third metatarsal shaft, with some increased thickness of the second metatarsal shaft cortices.

Dr. Peterson:

Six years after injury, the patient had recurrent pain and swelling, but this was not severe. She limped occasionally. Dr. Rab, would you comment please?

Dr. George T. Rab:

The entire shaft of the third metatarsal looks a little sclerotic.

Dr. Peterson:

Some days the foot looked completely normal whereas other days it was a bit swollen and tender over the third metatarsal, nothing more.

Dr. Rab:

I think the area should be explored surgically.

Dr. Tressler:

No treatment was advised. In the summer of 1971, which was eight years after her injury, she returned to our clinic. At that time, she had pain and swelling of the foot but no fever or drainage. She had mild swelling on the dorsum of the foot, with tenderness over the third metatarsal. Her sedimentation rate was 28 mm in one hour. The leukocyte count was 4,900/cu mm, with a normal differential count. Eight years after injury, she now has intermittent pain and swelling that have increased during the past several months.

Dr. Peterson:

The Xrays have shown no changes except for evidence of increased sclerosis of the second metatarsal shaft, with narrowing of its intramedullary canal. Dr. Rab, do you think a stress fracture could produce all of these changes?

Dr. Rab:

No.

Dr. Tressler:

Between April and October 1971, successive

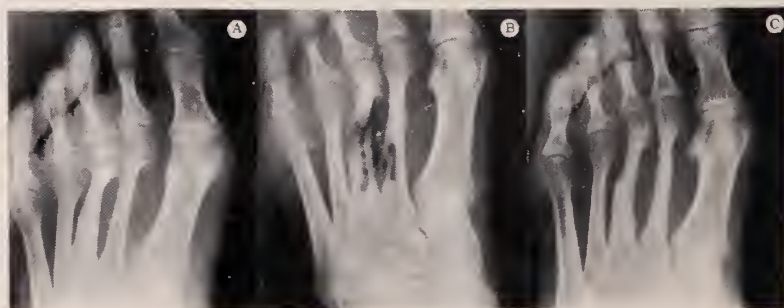


Fig. 3 (Case 3)—(A) Osteomyelitis of left second and third metatarsals six years after nail puncture wound. (B) Left second and third metatarsals after saucerization. (C) Left second and third metatarsals one and a half years after saucerization. Pain and swelling of foot are present.

sedimentation rates were 28, 30, 46, 54, 65, and 66 mm in one hour. At surgery the second and third metatarsals were saucerized, and cultures were taken (Figure 3B). Two days later, suction-irrigation was begun.

Dr. Peterson:

The third metatarsal was fractured during removal of the dorsal half of the bone. Saucerization of both metatarsals was carried distally after this operative Xray was taken. The wound was packed open for a couple of days until the results of cultures were reported.

Dr. Tressler:

Cultures from the third metatarsal grew *P. aeruginosa* and from the second metatarsal *S. epidermidis* and *Streptococcus* of the viridans group.

Dr. Peterson:

Isn't it strange that different organisms were cultured from each metatarsal? It makes one wonder if there was a contaminant. A separate irrigation system was instituted for each metatarsal. Even though the tubes were tiny, they irrigated well for 14 days. The third metatarsal was irrigated with gentamicin, and the second with normal saline and tyloxapol (Alevaire). Penicillin was given intravenously in a dose of 20 million units every 24 hours.

Dr. Tressler:

The wounds healed per primum. The girl continued to have intermittent swelling and pain. Fourteen months after operation (nine and a half years after injury), the Xrays showed evidence of sclerosis of both metatarsal heads.

Dr. Rab:

If this patient had asked you before surgery what the chances of success would be, what would you have told her?

Dr. Peterson:

I think the standard way to approach this question is to point out that historically once a patient has osteomyelitis he will always have osteomyelitis. At the present time, however, with better diagnosis and surgical management, supplemented with antibiotics, there is a reasonable chance that osteomyelitis can be cured. With this approach the patient is aware that cure is not possible in every case of chronic osteomyelitis.

Dr. Rab:

I asked this question because of a problem that has arisen in a few cases. The patient was told that he has a 70 to 80% chance of cure, and then

the physician working in the infectious disease area tells the patient that the chance of cure is 40%.

Dr. Peterson:

Once you start playing the game of percentages, you are in trouble. Each case is different, each with a specific bone and a specific infecting organism. Host resistance and organism virulence cannot be equated.

Dr. Mark B. Coventry:

It is very wise to avoid percentages in anything. When you start talking about percentages in something as indefinite as osteomyelitis, the patient tends to remember only some specifics. It is much wiser to do as Dr. Peterson says, namely, tell the patient that we may be able to give him relief and that we will try. I wouldn't go further than that. What is her state of health now? Is she well or not?

Dr. Tressler:

She has improved somewhat, but continues to have intermittent pain similar to the discomfort with which she presented in 1969, prior to surgery.

Dr. Coventry:

Do you think it is possible to properly saucerize, if that is the term, two tiny metatarsals like this? In the past, I have faced this by simply excising everything, knowing that I can't be sure which is viable bone or not.

Dr. Peterson:

Removal of the dorsal half of this small dense sclerotic bone was technically difficult. Removal of an adequate amount of bone invited fracture, but it was worth a try at that point. She has been seen frequently, and her sedimentation rate went from 20 to 65 mm in one hour during the two years from 1969 to 1971. After surgery, her sedimentation rate gradually decreased to 20. However, two months ago, it was up to 65 again. She also has recurrent symptoms. Some weeks she is fine. Then her limp will return, with swelling and tenderness over the dorsum of the foot. I don't think another course of antibiotics is indicated at this time. Excision of both metatarsal shafts as mentioned by Dr. Coventry appears to be the logical recommendation.

Dr. Bianco:

In line with what Dr. Coventry said, I have treated a boy who lost two metatarsal shafts in a snowmobile accident, and the defects were big enough so that the dorsum of the foot had to be skin grafted. He has had no significant disability at all.

Dr. Peterson:

The girl in the present case has questioned me closely about such an excision. What is her foot going to be like if these two metatarsal shafts are removed? I haven't been able to promise that she is going to be much better. How do you feel about this, Dr. Coventry?

Dr. Coventry:

Well, I think that she is not going to have a normal foot. Of course, you don't want to make her foot any worse, and you would like to maintain her toe length. But she will have a reasonably normal foot even if the second and third toes do shorten. She won't like the cosmetics, but I don't suppose she likes the recurrent pain and swelling, so she could trade one for another.

Dr. Peterson:

This is essentially what the patient has been told. She has been unwilling to go ahead with any more surgery at this time.

Dr. Einer W. Johnson, Jr.:

In your experience, Dr. Coventry, if you leave the periosteum, do you get any recovery or return of the shaft?

Dr. Coventry:

Oh, yes. In children I think you get a full return, as Dr. Peterson will testify, but I am not so sure that the metatarsal shaft will regenerate in adults.

Dr. Peterson:

This girl is now in her early twenties, and I would not count on it.

Dr. Coventry:

I wouldn't either.

Dr. Peterson:

The literature concerning puncture wounds is sparse. Dr. Lang has surveyed the literature and will give us a résumé.

Comment and Literature Review

Dr. Allen G. Lang:

Because of the severe complications from such a common injury as those presented in this fracture conference, I tried to find whether similar problems have been reported, how they had been handled, and whether any large series had been evaluated to determine the incidence of these complications. Actually, very little is available. One article consisted of a single case report of typhoid osteomyelitis of the os calcis after a puncture wound.¹

Two more pertinent articles included case re-

ports on *Pseudomonas* osteomyelitis. All patients were children, and all had prolonged hospitalizations and aggressive parenteral antibiotic therapy with surgical debridement, and all had some residual deformity. In 1968, Johanson² described 11 patients with *Pseudomonas* osteomyelitis after puncture wounds of the foot. In these patients, definitive diagnosis was delayed an average of three weeks. Certain characteristics were present in all 11. All patients received prophylactic antibiotics, tetanus toxoid, and local wound care consisting of nonsurgical cleansing, and all were advised to soak, rest, and elevate the foot. All patients improved during the 48 to 72 hours after injury and all then had increasing pain, discomfort, and swelling in the foot later. However, none of the patients was systemically ill, and only minimally elevated leukocyte counts and sedimentation rates were noted. After sufficient lapse, x-ray changes were noted; these consisted of generalized osteoporosis with demineralization especially marked at the infection site. In all 11 patients, the sites were either aspirated or surgically opened. All cultures grew *P. aeruginosa*, but the Gram stain in 10 of the 11 cases was negative. In three of the cases, previous cultures of the puncture wound had grown *S. aureus*. The author pointed out that the primary focus of infection in all of these patients seemed to be cartilaginous tissue, either articular cartilage or the cartilaginous growth plate. All 11 patients had significant sequelae: joint degeneration or premature closure of growth plates or both. Johanson recommended that puncture wounds in noncartilaginous areas be treated with simple debridement of superficial tissues. For cartilaginous area, he stated that "empiric reasoning suggests that debridement, irrigation, and closure over irrigation tubes are appropriate."

In 1971, three more patients with *Pseudomonas* osteomyelitis were described.³ Two of these presented the typical clinical findings as previously described, the symptoms beginning three to four days after injury. The third presented with a swollen painful foot 19 days after injury. All three were treated with surgical debridement and intravenously administered antibiotics, and all three had good clinical results.

The three cases presented herein and the cases reported in the literature were all from medical centers with preselected populations, and no attempt was made to evaluate the incidence of

these complications. In 1962, Houston et al.⁴ reviewed a series of 2,583 patients with puncture wounds who were seen during a seven-year period in various institutions in New Orleans. More than 90% of the injuries involved the soles of the feet. Two hundred eighty (11%) had late infections; these were mostly early cellulitis, which cleared overnight after debridement. This left 2,303 patients who had no infection when first seen. Of these, 51 patients (2%) developed wound infection, of which one patient had osteomyelitis.

These results were obtained with the following standardized treatment regimen. The wounds were cleansed with hexachlorophene and water, and the epidermal edges were excised using an ordinary cuticle clipper, thus visualizing the wound for irrigation and removal of gross contaminants. A dry sterile dressing was then applied, and the patient was instructed to spread the wound open and soak it several times a day for a few days and to return only if signs of inflammation developed. For wounds that were deeper or bled significantly, a one-quarter inch iodoform gauze sock, which was soaked in erythromycin, was used for one to two days. All patients received tetanus immunizations, and 20% of those seen with fresh injuries received antibiotics, either as prophylaxis or later as treatment for a subsequent infection. Eighty percent of the patients who were initially seen with established infections received antibiotics. Of the 51 patients who were seen with fresh injuries and who developed infection later, no data were provided as to whether or not they received antibiotics prophylactically.

Summary and Closing Comments

The incidence of infection in patients with puncture wounds who receive good primary care is low, and the incidence of osteomyelitis is extremely low. However, if a patient returns three or four days after injury with signs of inflammation, an attempt should be made to obtain a specimen for bacteriologic study. *P. aeruginosa* is a likely instigator.

Dr. Peterson:

Thank you. Dr. Petty, having heard all of this, would you now alter your basic care of the puncture wound?

Dr. Petty:

I think the wound care that has been recommended in the paper in New Orleans is reasonable. I still don't think I would be interested in giving prophylactic antibiotics to all patients.

Some patients have *Pseudomonas*, others *S. aureus*, and some even have fungi infections.

Dr. Peterson:

What about checking the wound in three or four days? Do you think that is necessary?

Dr. Petty:

I think it would be wise. Some patients will come back with the first sign of infection, whereas you may have to check on others.

Dr. Peterson:

I would like to add to the basic recommendations. Wounds that go through the foot should be treated like a gunshot wound that goes through any part of the body. The patient should be taken to the operating room and the wound irrigated and, if necessary, debrided under anesthesia.

The depth of a "simple" puncture wound is most important. A blunt probe should be placed into every puncture wound. This can be done in the emergency room without anesthesia, even in children. If the wound extends to bone or even just through the deep fascia, then the patient also should be taken to the operating room and the wound debrided. This adds a lot of expense and time, but if it would prevent osteomyelitis, it is worthwhile.

Dr. Coventry:

I think we are missing a very important point, and it gets back to the basics of practicing medicine—a good history. The series from New Orleans was an urban population, as I remember. There is another series that involved a construction job in which the nails were all clean, new nails. Old lumber was not used, and the worker didn't walk in the barnyard and step on old nails that were rusted and full of soil. The incidence of infection in this series was as low as 2%. So, I think it is important to ask the patient about the penetrating object. If it is an old abandoned chicken coop and a rusty nail, it is a lot different than a brand new nail on a construction job. I think it is very important not only to determine the depth of the wound, which was stressed, but also the nature of the penetrating object.

Dr. Peterson:

And, of course, the retainment of a radiolucent foreign body is a complete subject by itself.

Dr. Richard S. Bryan:

In one series of open fractures, the initial cultures never agreed with the final cultures. I am really not at all certain if the best treatment can

prevent infections. I don't think there has ever been a proved treatment to prevent osteomyelitis from occurring.

Dr. Peterson:

Do you recommend no treatment?

Dr. Bryan:

No, I would not, but I think what Dr. Coventry has said makes excellent sense.

Dr. Peterson:

The question of taking a routine Xray has not been answered. I would also base this decision on the depth of the wound, as determined by the probe. Any wound that punctures the deep fascia should be Xrayed.

Dr. Petty:

Even if it is a clean nail?

Dr. Peterson:

Yes. The nail usually goes through a shoe or something. Even though most Xrays would be negative, there could be a retained fragment of nail or rust. From a medicolegal standpoint, it would be wise to have an Xray.

I would like to stress the importance of local wound treatment when caring for puncture wound of the foot. The depth of the wound must be determined. Wound toilet must be adequate and aided by surgical debridement when necessary. Proper tetanus immunization is mandatory. The data are insufficient to prove the effectiveness of prophylactic antibiotics. But it should be emphasized that a puncture wound of the foot is sometimes not an insignificant injury.

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Continued on page 802

Cadaver Organ Retrieval

Participation of the Community Hospital

A. W. MOBERG, M.D., E. G. YONEHIRO, M.D., E. A. SANTIAGO, M.D., R. L. SIMMONS, M.D. and J. S. NAJARIAN, M.D.*

ALTHOUGH POST MORTEM DONATION of various organs (kidneys, pancreas, liver, etc.) has become a humane and honorable gesture, clinical transplantation is still limited by the availability of suitable donor organs. Approximately 7,500 of the 55,000 people who die each year of primary renal disease could be helped by transplantation.¹

One potential source for cadaver organs is the community hospital where most traumatic injuries are treated. Although people have recently begun to request that their organs be procured in the event of accidental death, the opportunity for organ donation has been logistically limited. Today, improved communications between the transplant centers and outlying hospitals have overcome the problems relating to definition of donor death and maintenance of organ viability. Therefore, using new methods of organ preservation and transportation, it now seems technically feasible for all communities to participate effectively in organ procurement.

There are several advantages for initiation of a community retrieval program. Local organ procurement eliminates the need to transfer the donor and enables the family to maintain continuity of care with their personal physician. It abolishes the psychological problems of adapting to a new hospital environment and doctors unacquainted with the donor's previous care. The chance that the fatally injured donor will die before the organs can be saved is minimized, resulting in an increased number of transplantable organs. Finally, some of the usual family grief associated with an accidental death may be relieved by the opportunity for organ donation.

Criteria for Donor Acceptance

Table 1 summarizes the general criteria a potential donor must possess to be considered acceptable.

Emergency nephrectomy following an acute

death may render cadaver kidneys suitable for transplantation. More often however, the time required for nephrectomy and organ preservation yields nonviable organs. Under most circumstances, brain death must be present for organ donation to be possible from a community hospital.

Brain (neurologic) death is the most frequent circumstance leading to retrieval of cadaver organs. Under these conditions, the maintenance of a normotensive state allows time for donor stabilization and determination of organ function, acquisition of consent for donation, preparation for organ preservation and duration of travel for the organ procurement team. These organs, following various periods of *ex vivo* storage, generally function immediately upon implantation.

Definition of Brain Death

Cerebral death broadly means "cessation of life-supporting function of the central nervous system." The usual candidates for cadaver organ donation are young or middle-aged patients involved in various traumatic accidents with injuries primarily limited to the head. Recently, the traditional concept of death (cessation of heart beat and respiration) has been challenged because of increasing social and medical concern regarding the artificial maintenance of cardiopulmonary function by modern resuscitative equipment. Such support in the presence of a hopelessly injured

TABLE 1	
Criteria for Consideration as Organ Donor	
A.	Neurologic death (all causes) with certainty of the absence of spontaneous respirations.
B.	Age limit of 65.
C.	Absence of systemic sepsis.
D.	Absence of generalized malignancy (outside CNS).
E.	Absence of premortem disease of the potential transplantable organs, i.e., history of renal disease.
F.	Reasonable expectation for maintenance of stable cardiovascular state and organ function, i.e., urine output.
G.	Consent for organ donations from the relatives of the decedent (Table 7).

*Department of Surgery, University of Minnesota Hospitals Minneapolis. See editorial, page 773.

central nervous system only serves to maintain a vegetative state without justification. A redefinition of death based on the integrity of the central nervous system is preferable, in view of the mechanical ability to prolong a vegetative state indefinitely. The termination of supportive measures not only reduces the suffering of the patient's family and their economic burdens but it also enhances the effectiveness of the medical staff caring for such a patient. It is of secondary importance that this circumstance is ideal for making available cadaver organs suitable for transplantation.

The definition of the state of cerebral death was the subject of an Ad Hoc Committee of the Harvard Medical School in 1968.⁴ According to the criteria which they accepted, cerebral death exists under the following circumstances:

1. No spontaneous respiration.
2. No superficial or deep reflexes (pupillary light reflex included).
3. No movements either spontaneous or secondary to painful stimuli.
4. Electrocerebral silence by electroencephalogram (EEG).
5. All of the above findings should show no change 24 hours later.

These criteria have recently been modified by the Neurosurgical Department of the Minnesota Health Sciences Center.⁵ The amended criteria of brain death are summarized in Table 2. Within our center an unresponsive EEG is not mandatory. Although a great deal has been written on the prognostic value of the EEG, the degree of activity necessary to be compatible with functional recovery of the central nervous system is not known. It may be used as a confirmatory test of the clinical judgment, but in the absence of agreed prognostic value the necessity for an EEG to pronounce cerebral death is unproven. Much more reliance must therefore be placed upon clinical judgment.

At the community hospital, reliance upon the EEG will depend upon the availability of a consulting neurologic or neurosurgical staff for clinical opinions as well as the interpretation of the EEG. Dependence upon this test is a matter of joint decision between the medical and administrative hospital staffs. A committee comprised of a neurologist, family practitioner and an internist may make the pronouncement of "brain death" according to the outlined criteria (Table 2).

Maintenance of Organ Function after Brain Death

When cerebral death has been pronounced and donor acceptance determined, management involves the maintenance of the cardiac, pulmonary and organ functions. An appropriate management plan consists of the three following broad categories:

1. Documentation of satisfactory organ function (renal status).
2. Supportive measures for cardiopulmonary system.
3. Supportive measures for renal function.

The important facts that must be documented before acceptance as a kidney donor are listed in Table 3. In cases of trauma there is frequent slight hematuria which does not preclude utilization of the organs. Often, premortem oliguria is iatrogenically induced by dehydration during treatment of cerebral edema in the neurologically injured patient. Oliguria explained on this basis does not exclude organ donation since urine output is usually corrected by adequate parenteral therapy. Renal failure secondary to the hepato-renal syndrome does not eliminate the use of those kidneys, since renal function will return upon implantation into a new host.

TABLE 2
Criteria of Cerebral Death

1. No spontaneous movement
2. No spontaneous respiration when tested for period of 4 minutes at a time.
3. Absence of brain stem reflexes:
 - a. dilated and fixed pupils
 - b. absent corneal reflexes
 - c. absent ciliospinal reflexes
 - d. absent Doll's head phenomena*
 - e. absent gag reflex
 - f. absent vestibular response to caloric stimulation
 - g. absent tonic neck reflex
4. A status in which all of the findings above remain unchanged for at least 12 hours.
5. Brain death can be pronounced only if the pathological processes responsible for the above are deemed irreparable with presently available means

*Absent proprioceptive head-turning, also called oculocervical reflex.

TABLE 3
Documentation of Renal Function

1. Absence from history of previous renal disease such as hypertension, frequent infections, diabetes.
2. Normal urinalysis.
3. Satisfactory values for BUN, creatinine, electrolytes, blood sugar, and a two, 12 or 24 hour creatinine clearance.

Table 4 summarizes the desired parameters which indicate ideal support of the cardiopulmonary system ($BP > 100$; $P < 120$; CVP 10-15). The use of vasopressor drugs to achieve these values is avoided when possible. Satisfactory circulatory support can be maintained with adequate volumes of intravenous fluids and appropriate pharmacologic agents (Digitalis, electrolytes, antiarrhythmia therapy). In our experience, vasopressive agents are rarely required—when necessary Isuprel (10 ml of 1/5000 in 500 ml D_5W and 1 amp of $NAHCO_3$) is given by microdrip at a rate which maintains blood pressure.

TABLE 4	
Ideal Systemic Parameters	
Blood Pressure	> 100 mmHg Systolic
Pulse	< 120 /min
Central Venous Pressure	10-15 cm H_2O

The appropriate intravenous therapy required to stimulate urine output (100 ml/hr) is listed in Table 5 and consists of equal volumes of both a colloid and crystalloid solution. After initial hypovolemia is corrected, a crystalloid solution (D_5W $\frac{1}{2}$ NS with 25 mEq/L KCl) is administered at a rate which enables hourly replacement of urine volumes. An equal volume of the colloid solution (Plasmanate) is given as required to support blood pressure and central venous pressure. The CVP may rise in response to fluid administration without adequate urine output. In this case, urine is stimulated by giving a Lasix and Mannitol solution (500 mg Lasix in 500 ml 20% Mannitol at a rate which maintains urinary output at 100 ml/hr).

Technique of Organ Procurement

Organ retrieval is best accomplished by a group

TABLE 5

Maintenance of BP; CVP; Urine Output

1. Increase CVP to 10-15 cm H_2O by correcting any initial hypovolemia with whole blood or plasma (plasma protein fraction); BP usually responds.
2. Maintain BP > 100 mmHg; CVP $> 10-15$ cm H_2O with a colloid solution (plasma, plasma fraction, blood) given in volumes* as required.
3. Maintain urine output at 100 ml/hr by administering a crystalloid solution (D_5W $\frac{1}{2}$ NS with 25 mEq/L KCl) in a volume* equal to the hourly urine output.
4. Low urine output in the presence of adequate BP, CVP, and fluid administration can be corrected with Lasix and Mannitol solution (500 mg Lasix in 500 ml 20% Mannitol) given at a rate sufficient to stimulate urine production.

*The volumes of the colloid and crystalloid solution should be approximately equal. The crystalloid solution when given alone often is not sufficient to maintain BP and CVP.

comprised of both intrinsic interested physicians on the local medical staff and a surgical procurement team from the transplant center. Success of any community organ procurement program depends upon the establishment within the local hospital of a team composed of both physicians (internist, nephrologist, surgeon, neurosurgeon, neurologist) and paramedical personnel (hospital chaplain, charge nurse, etc.) on the case. This group (liaison team) should be separate from any surgeon to minimize any possibility of "vested interest." This team would assist the potential donor's primary physician in:

- A. Determining suitability for organ donation.
- B. Obtaining permission from the next of kin (Table 6).
- C. Preoperative donor management to maintain maximal organ viability and function.
- D. Intrahospital logistical cooperation between all concerned.
- E. Create for the relatives the smoothest pos-

TABLE 6
Consent Form

DONATION OF BODY BY DECEDENT'S RELATIVE

I, the undersigned, being of full age (18) or over and sound mind, donate all usable organs of the body of _____, my _____, for use in grafting and/or transplant

(relationship of decedent)

purposes, for medical purposes, without restriction, to the University of Minnesota Health Sciences Center.

Immediately upon _____ being pronounced dead, I authorize any physician and/or hospital to perform the necessary surgical procedure, and immediately thereafter, to deliver the body to the next of kin for burial.

I specifically release any hospital, its physicians, or other employees from any liability in performing the necessary surgical procedure to carry out this donation and specifically relieve the hospital from any responsibility for burial.

Date: _____

Signature of Donor _____

Witness _____

sible transition from acceptance of death to granting permission for organ donation.

F. Maintenance of an appropriate hospital image.

The prerogative of the donor's primary physician to become involved in organ procurement should be his choice. Although he may wish to maintain continuity of care and family rapport throughout declaration of death and organ donation, the intrahospital liaison team should be organized such that the primary physician need only contact them to handle the matter.

The composition of the liaison team should be sufficiently broad so that all matters concerned in organ donation are adequately organized. This includes assistance in determination of donor death, preoperative donor management, and understanding of nursing and operating room procedures. Of equal importance is the establishment of a proper relationship with the relatives and the community to avoid adverse hospital publicity,

and to enhance the image that the community hospital provides high quality primary medical care.

Upon notification by the primary care physician of a potential donor death, the liaison team should insure that the prospective donor meets the basic criteria for organ donation (Table 1). If so, the surgical procurement team from the transplant center* should be notified; they will then proceed to the local hospital to assist in removal of the usable organs and initiation of organ preservation procedures.

During the operative removal of kidneys, every effort is made to maintain them in the diuretic state induced prior to the nephrectomy. Care is taken to avoid vasospasm in the renal arteries by gentle handling of the organ. In cases where multiple renal arteries are found, preservation and subsequent renal transplantation is augmented if the kidneys are resected "En Bloc" with a segment of aorta and vena cava, as utilized in

*University of Minnesota: Telephone 612-373-8322.

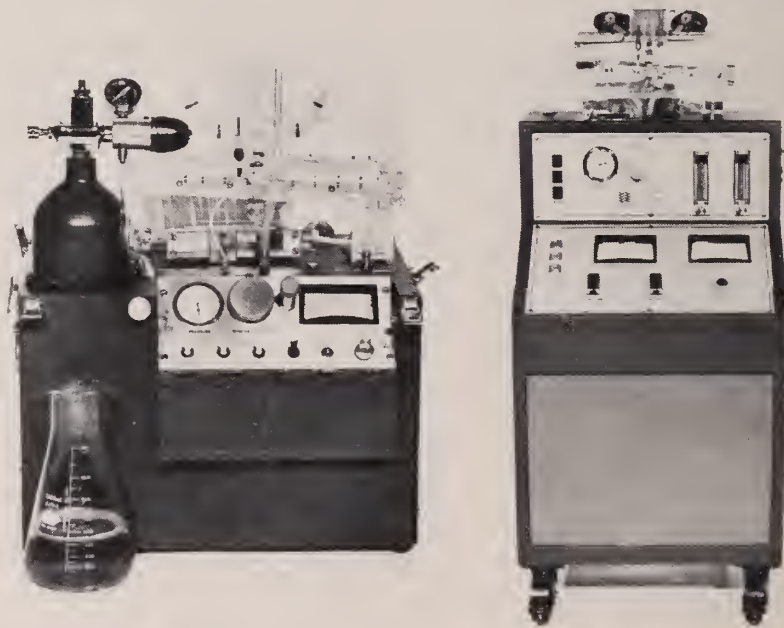


Figure (Left)—Transport Module. Measures 43 cm x 33 cm x 54 cm and weighs 30 kg. Operates on standard A/C or independent battery power. The organ cassette is easily transferred to the hospital console following disengagement of pump, temperature, air and heat exchanger connections.

(Right)—Hospital Console. Provides the cassette with a pulsatile pump, a gas source for air, CO₂, O₂ and Freon refrigeration with constant temperature regulation. The simplified control panel is easy to operate; minimal supervision is required. Renal artery pressure and plasma flow is controlled by the stroke volume and pulse rate; pH is maintained by appropriate CO₂ and O₂ gas flows.

(From Moberg AW, Santiago EA, Mason RV, Mozes MF, Campos RA and Najarian JS Transportable organ-perfusion system for kidney preservation. *The Lancet* 2:1403, 1971.)

rapid nephrectomy.

Prior to organ removal the following agents are given intraoperatively:

1. Methylprednisolone (SoluMedrol)—30 mg/kg given 1 hour prior to nephrectomy.
2. Patients are systemically heparinized (20,000 units) prior to nephrectomy.
3. The previously described Lasix and Mannitol drip is given intraoperatively to maintain urine output.
4. Ten minutes prior to nephrectomy one ampule Mannitol is given intravenously to induce a final diuresis.

The removed kidneys are immediately placed in a basin of cold sterile saline and in sterile saline ice cubes. The renal arteries are cannulated and the kidneys flushed at 4°C with medicated Ringer's lactate (10 ml Heparin, 10 ml 1% procaine). Other special agents or solutions which potentially could be required are summarized in Table 7.

Role of Organ Preservation Techniques

The development of successful organ preservation techniques now permits the *ex vivo* maintenance of organ viability. These methods allow the use of kidneys retrieved in distant hospitals. The preservation technique employed utilizes *ex vivo* organ perfusion with cryoprecipitated plasma under hypothermic conditions using an apparatus designed at the University of Minnesota (Figure). This apparatus permits transportation and storage of organs up to 72 hours.

TABLE 7
Specialty Items Required for Organ Procurement
The following items are required at hospitals participating in cadaver organ retrieval:

A. Medications

- Lasix—Up to 2 gm/patient
- SoluMedrol—Up to 3 gm/patient
- Mannitol—Up to 500 ml of 20% solution
- Heparin
- Low Molecular Weight Dextran (Dextran 40 and Rheomacrodex)
- Plasma substitutes
- Purified Protein Fractions
- Plasmanate, etc.

B. Surgical Equipment:

1. A general laparotomy tray, and vascular equipment (arterial and venous clamps with vascular suture)
2. Chilled Ringer's Lactate (4 one liter bottles at 4° C) for washing of kidneys
Added to the Ringer's Lactate are:
a) Procaine—10ml (1%)
b) Heparin—10 ml (1000 units/ml)
c) NaHCO₃—5 ml
3. Two to four trays of sterile frozen normal saline
4. Sterile IV fluid administration sets.

Financial Considerations

In the past, a recipient's insurance carrier has reimbursed all costs of organ procurement, including hospitalization costs beyond pronouncement of death, medications, use of the operating room, surgeon's fee, and fees of ancillary personnel on the liaison team. In the event that such costs are not met by the insurance carrier, all reasonable costs of organ procurement will be borne by the Department of Surgery at the University of Minnesota from research funds designated for this purpose.

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Dean Lawrence Weaver

Dean Lawrence Weaver of the University of Minnesota's College of Pharmacy is the new president of the American Association of Colleges of Pharmacy.

Classified Advertisements

Continued from page 796

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INTERNIST-FAMILY PRACTITIONER to join three Family Practitioners and one Board Certified Surgeon in Incorporated group practice. Only 60 minutes north of the Minneapolis-St. Paul area with easy access to lakes and outdoor sports. Facilities include New Clinic, 63 bed general hospital with ICCU and 87 bed nursing home, all new. Call or write: Larry J. Brettingen, M.D., 224 7th St., Mora, Minnesota 55051, Ph. (612) 679-1313.

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PHYSICIANS ASSISTANT—Graduate University Washington MEDEX program. Three years Special Forces medic, one year with GP. Resume upon request. Michael Erkel, Route 2, Box 142, Kimberly, Idaho.

Alcohol Treatment Centers Problems and Recommendations

MILTON H. SEIFERT, JR., M.D.*

THE ADVENT OF THE treatment center for alcoholism (especially into the hospital setting) was welcomed by many, but especially by physicians involved in primary health care. The perspective of time now tells us that this complex disease is still difficult to treat and that the treatment center approach does not guarantee a good result.

While a treatment center seems to have improved the success ratio, physicians are now being faced with an increasingly prevalent problem and that is the alcoholic patient who is a treatment center failure. Whatever else is said about this entity, it must be viewed as a serious complication of the disease process.

In the reassessment of treatment center procedures, it seems possible that first, the treatment center may not be providing the basic components of health care delivery, and secondly, the treatment center may not be making enough use of the primary health care physician, especially the personal family physician. That these two facts are related to each other and they in turn are related to the complication of treatment center failure is the point of this paper.

Treatment center policies reveal that there is an attitude of secondary importance with respect to the physician services and personal and family health care services. Some centers have only one physician-director, and in others, a patient may choose his own physician or take a physician on "rotation." One policy states that the patient "will in effect become a patient of the (hospital) for the duration of his stay in the (treatment center)." A policy has not been found requiring the physician to have any special qualifications nor one that defines a role for the physician as an integral part of the treatment plan. Nor has a treatment center policy been found that recognizes a necessary interdependence on the other health care resources. This attitude should be considered as one that could compromise the therapeutic

efforts of the alcohol treatment professionals.

In the Alcoholic Anonymous (AA) community there is suspicion regarding the competence of the physician to deal with the disease of alcoholism. To some extent this prejudice has carried into the treatment center and has hampered the function of physicians. In some instances, the physician has been met with rejection because he himself was not an alcoholic, he was not formally trained in the alcohol counseling techniques, or he was being held responsible for alcoholics who had done poorly because they had controlled the management of their own care.

An inadequate role definition with its attendant inadequate physician participation is not in our best interests. It is bad for the physician who has an educational need in this area and for the patient if the physician was competent in the first place.

In the process of the redesign of treatment center procedure, consideration should be given to the disease itself, the basic components of health care delivery, and the skills and perspectives of the family physician. Alcoholism is a family disease that is common, chronic, progressive and multifaceted. The basic components of health care delivery are availability, comprehensiveness, effectiveness, continuity and individualization. The special capabilities of a family physician enhance the probability of delivery of the basic health care components.

The family physician can contribute to increasing the success of treatment by being available for the early diagnosis and treatment of a common disease and for crisis intervention. A generalist almost by definition is better able to see the need for and thus advocate a comprehensive set of health services. Effectiveness of treatment can be insured by the ability of a family physician to provide an ongoing assessment of the treatment program in terms of both the patient and his family. The privileged relationship that a family physician has to his patient and to the family provides

*A Family Physician in General Practice.

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pre-existing trust that can be useful in the face of alcoholic rationalization. Pre-existing insights allow for individual application of the comprehensive resources. If the whole treatment team would allow it, the family physician could reduce unnecessary fear by offering the patient a real measure of personal protection especially when a particular treatment modality makes the patient worse.

The delivery of continuity may be the most valuable of the basic health care components in the treatment of alcoholism. An incurable, lifelong, chronic disease always requires continuity. Often, the delivery of continuity in health care depends on a continuing relationship with a health professional. The patient leaves the treatment center eventually, and usually gravitates away from the outpatient program as well. But a continuing relationship with a personal physician is a natural sort of thing. Whenever any treatment program is shown to be inadequate (such as when the patient is about to become a treatment center failure), a family physician can quickly move into the breach, negotiate the revision of a new treatment plan, maintain continuity, and, prevent the treatment center failure complication.

Alcoholism is, by definition, a family disease, and the treatment effort ought to require the participation of a family physician specialist for each patient. It has long been accepted that the non-alcoholic family members are just as sick in their own way and in need of an intensive treatment program too. It is here suggested that a successful treatment team should include the following: the patient; his physician; the family; a recovered alcoholic; and, a spiritual advisor. Other services that may indeed be necessary for survival are usually quite adequately provided in the treatment center setting.

With these thoughts in mind, the author urges that treatment center policies deal more realistically with the disease of alcoholism as we know it, and, at the same time, make better use of the available health care resources. The recommendations are as follows:

1. The treatment team should include a general physician, preferably one who has a pre-existing relationship with the patient and his family.
2. The functional role of the family physician should be defined in terms of the disease process and the natural capabilities of this professional.
3. The treatment team should use a problem-oriented medical record, especially as it applies to the problem list, i.e., a listing of all of the patient's physical, mental and social problems. This will insure a more comprehensive approach.
4. Provisions for long term continuity of care should be defined and include other health resources as appropriate.
5. There should be developed a treatment center definition of an interdependent treatment team, having the participating team members define their roles and their dependence on other team members.
6. All members of the interdependent treatment team should participate in decision making in the following areas: a) the suitability of the patient for treatment; b) the suitability of the treatment for the patient; c) the ordering of the treatment priorities in relation to the patient's comprehensive problem list; d) design of a family treatment plan; e) revision of treatment plans for the patient and his family; f) assessment of the patient's progress; and g) planning for discharge and long-term maintenance.

Summary

While the family physician welcomes the help of the alcohol treatment facility and notes its improved results, he finds that he is not considered necessary in the treatment program, and, in some cases, even finds himself unwelcome. This would be acceptable if the treatment center had produced a uniformly good result.

It would seem that the treatment center, by its attitude and its policies, does not generally appreciate the capabilities of the personal family physician. This article has outlined the ways in which this health care professional might materially contribute to the success of the treatment center effort.

A revision of treatment center policies is suggested, and to this end, some specific recommendations have been made.

R. F. Schmidt, M.D.

Dr. R. F. Schmidt was honored by Alden on occasion of his twenty-five years of service to that community.

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Opinion & Dialogue

"Prescription drugs – who should determine the maker?"

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Association



Maker of
Medicine

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"Too many doctors are dependent to the economic consequences of their decisions." So stated an issue of *Medical News Report* (December 4, 1972), an independent weekly newsletter published by AMA Chief Executive F. J. L. game, M.D.

Doctor, are you indifferent...

In discussing an anticipated increase in Blue Shield rates, *Blue Shield's* newsletter had this to say:

"In general, it can be said that we have given the impression that we are not particularly concerned with the increase in cost of health care to patients..."

"True, an MD's training is primarily scientific, but in the real world of practice, all of his scientific decisions have a price tag, or an economic impact. The economics of health care beckon the practitioner's attention. Concern for economics of medicine is a reality."

When the pharmacist recommends that a drug product other than the one ordered be dispensed, the prescriber invariably permits the change when he feels the best interests of the patient will be served.

Shortcomings of Pro-Substitution Argument

The fact remains that it is necessary for the prescriber to know the change is being contemplated and to be in a position to concur or demur. Without that opportunity for unilateral decision of the pharmacist made in the absence of clinical knowledge of the patient, could expose to needless risks, and in addition jeopardize the relationship between the professions of Pharmacy and Medicine. In my view, there is no offset in the pro-substitution argument to offset these risks.

The Issue of Drug Knowledge

Substitution advocates claim that the primary justification for changing the rules is the desire to better utilize pharmacists' knowledge about drugs. Yet the pharmacist's task to keep current on the ever-changing field of drug therapy, to some extent puts him at a disadvantage. Most often, a practicing physician with expert knowledge of no more than

Too many doctors are indifferent to the economic consequences of their decisions. Too many, for example, habitually hospitalize patients for the convenience of the MD. It's time to deny such habits exist. . . . Doctors, thru their medical societies, have unhesitatingly appealed to the patients for support in the fight against government interference in the private practice of medicine. The public in the past has responded. It's time the American Medical Association and state and local medical societies paid off the debt by their action to hold down the cost of medical care."

Drugs

Insurance rates and hospital
are only two factors in health

care costs. The cost of drugs—both prescription and nonprescription—is another.

And when it comes to drug costs, the nation's pharmacists are *concerned*. Through their national professional society, the American Pharmaceutical Association, pharmacists are advising the public to use nonprescription medication cautiously and conservatively, and to seek the advice of their pharmacist before selecting or purchasing such drugs.

Outdated Laws

The pharmacist also is aware that when it comes to prescription drugs, often he has an even greater opportunity to reduce the cost to the patient—with no sacrifice in the quality of the medication dispensed. But in many states, outdated and antiquated laws prevent the pharmacist from engaging in drug product selection. “Drug product selection” simply means that the pharmacist functions in the patient’s interest by consciously choosing, from the multiple brands available, a low-cost quality brand of the specific drug to be dispensed in response to the physician’s prescription order.

Much *misinformation* has been purposely spread by those who stand to gain financially by maintaining

high drug costs to the public. An endless stream of propaganda has emanated from the drug industry in an effort to persuade the medical profession that these so-called anti-substitution laws should be retained. And as long as these laws are retained, the drug industry will continue its current marketing practices which contribute unnecessarily to high drug costs to patients. These practices also are inviting government agencies to expand their restrictive controls on physicians and pharmacists.

APhA Efforts

As pharmacists, we are concerned about health care costs. We hope that every physician shares our concern on this vital issue, and will give his personal support to the constructive efforts APhA has undertaken in the interest of all patients.

(For a complete discussion of drug product selection, you are invited to request a free copy of the "White Paper on the Pharmacist's Role in Product Selection" from: American Pharmaceutical Association, 2215 Constitution Avenue, N.W., Washington, D.C. 20037.)

Drugs that he selects to treat the variety of conditions encountered in practice. Moreover, the physician's choice of a specific brand is based on his knowledge of the patient's medical history and current condition, and his experiences with particular manufacturer's

Some substitution proponents argued that the dispensing of a substitution is a simple two-party transaction between the pharmacist and the patient, and that a substituting pharmacist may avoid even a minimal breach of contract by simply informing the patient that he is making a substitution. I would judge that courts would be sympathetic to a pharmacist who substituted without physician approval and who took a legal defense that seeks to make the patient responsible for the pharmacist's actions.

Would Prescription Prices?

stitution advocates are arguing to the consumer, and partly the consumer activist, that a change in prescription prices could be achieved through the legalization of substitution. There is seen absolutely no evidence to support this claim. To the contrary, the experience in Alberta, Canada, where substitution is authorized, suggests

the opposite.

Many pharmacists understandably are concerned about the cost of maintaining multiple stocks of similar products. While there is no doubt that inventory costs rise when additional brands are stocked, it would be interesting to know how much they rise, and how many pharmacists actually stock all brands—of, say, ampicillin or tetracycline—or how long they keep “slow moving” products on their shelves before they are returned for credit. To ask that the industry eliminate multiple sources is to ask competitors to stop competing.

Drug Substitution—A License for the Unethical

Anti-substitution repeal would favor "corner cutting" pharmacists and manufacturers. For them, free substitution would be not a right, but a license. As an aftermath, it is quite likely that the confidence of both physicians and patients in the profession of Pharmacy would be eroded, as revelations about the unconscionable behavior of an undisciplined few were magnified in the press or in professional circles.

Summary

In short, what the American Pharmaceutical Association advo-

cates as a broad-spectrum panacea looks to us to be not only a minority view (advocacy of substitution is by no means a uniform policy in Pharmacy), but also an extraordinarily costly and ineffective remedy, whose side effects are odious. We believe (1) that an impressive majority of pharmacists prefer to work with Medicine and with industry, for the consumer, and for the general good, (2) that they seek the privilege to substitute when the patient might gain and when the patient's doctor agrees, and (3) that they seek to work for the resolution of genuine grievances openly and professionally.

(For amplification of PMA views, please write for our booklet, "The Medications Physicians Prescribe: Who Shall Determine the Source?" It is available from: Pharmaceutical Manufacturers Association, 1155 Fifteenth Street, N.W., Washington, D.C. 20005.)

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Washington, D.C. 20005





Book Reviews

LAW OF HOSPITAL, PHYSICIAN AND PATIENT—(THIRD EDITION), Emanuel Hayt, LL.B., Lillian R. Hayt, M.A., J.D., and August Groeschel, A.B., M.D., M.S., F.A.C.H.A. Physicians' Record Company, Berwyn, Illinois. 1205 pages.

A large portion of the contents of this well-bound, hard cover book dealing with a tremendous fund of valuable medical-legal knowledge is almost completely lost to the reader who wishes to look up a specific problem, principally because of a lack of an adequate index to guide him to the numerous pearls within. Only eight pages of topic index!

Though I found the book fascinating and well worth having for reference work, less than 10 percent of my immediate concerns could be found in the index.

There is an index of cases, which is also almost meaningless, for these are not categorized in any manner that might disclose the nature of the case. There are IX pages of contents with chapter headings and subheadings, but if I wished to look up the medical-legal considerations of for instance, witnesses, contributory negligence, erroneous diagnosis, reckless treatment, hospital pharmacy, or slippery floors, only by a remote chance would I have found these items after carefully scrutinizing approximately 1000 pages. The right hand page headings representing the chapters are excellent and helpful, but insufficient to provide an index for such a large volume of desperately needed information.

If—as is occasionally the case—the publisher insisted upon preparing the index, the authors should not have permitted it, for only they know where the jewels lie.

The reader will have to hunt.

Carl O. Rice, M.D., Ph.D.
Editor Emeritus

FUNDAMENTALS OF CHEMOTHERAPY, William B. Pratt, M.D., Oxford University Press, 1973. \$6.95 paperback.

This is a fairly short up-to-date text intended for the medical student, graduate student in pharmacology, and the physician and deals with antibiotics and other chemotherapeutic agents, classified according to their biochemical site of action. In order to understand the author's explanation of the mechanism of action of the various drugs, one needs to be fairly familiar with current concepts of cellular biochemistry. There are ample references to recent research studies, including quite a few extrapolated tables of data. In only a few instances is there any reference to recommended dosages, and therapeutic indications are dealt with only briefly in most cases.

There is considerable emphasis given to drug resistance and drug interaction, although there is no attempt

to make an exhaustive coverage of all the many examples of drug interactions.

I would not recommend this book for the average medical student or clinician, if this were to be the only reading on antibiotics. For those with a special interest in biochemistry and pharmacology however, is a worthwhile publication and is reasonably cheap being in paperback form.

Linda Thompson, M.I.
Minneapolis, Minn

PANCREATITIS, Earl E. Gambill, M.D., M.S., F.A.C.I. The C. V. Mosby Company, St. Louis, 1973, 302 pages and price: \$28.50.

This beautiful monograph on Pancreatitis comes to us from the Mayo Clinic and covers all aspects of pancreatitis in 16 chapters. Earl E. Gambill wrote six chapters in addition to the Introduction, and four chapters are contributed by gastroenterologists, one chapter by a radiologist, and one chapter by a surgeon.

Although the subject is discussed with clarity and completeness in every field, one gains the impression that the book is especially strong in its chapter on the Normal Pancreas, and in some chapters on Clinical Evaluation.

Occasionally one has the feeling that the author of a chapter was not quite sure how much of his field another author would cover in another chapter. Rather than refer the reader to a page, he is referred to a chapter number or chapter heading, which necessitates going back to the Table of Contents to find the reference. For example, in searching for the techniques of the Secretin Test in Chapter 9 by Gambill on Laboratory Tests in Pancreatitis, one finds it mentioned only in one sentence and is referred back to Chapter 2 by Go and DiMaggio on the Normal Pancreas. The discussion of the test in this chapter, although very thorough and accurate, is not very practical. A better description is found in Chapter 3 on Exocrine Pancreatic Function Tests. I found no mention of treatment of pancreatitis with Trypsin inhibitors or Trasylol in the Subject Index or in the text. This may well reflect the attitude of the authors to this mode of treatment, but one would like to find a critical discussion in an extensive monograph of this type anyway.

In the Chapter on Surgical Treatment of Pancreatitis I tried to correlate the more recent literature on near total pancreatectomy with the text, which was difficult because the reference numbers in discussing diverse procedures jumped without rhyme or reason. I did not find this inconsistency in other chapters.

Although the publication date for this book is given as May of 1973, it was probably written one year earlier and thus has no reference to the very new and promising fiberoptic techniques of cannulization of the papilla of Vater, common bile duct, and pancreatic duct.

These small defects should not detract from the value of this authoritative and otherwise complete treatise on pancreatitis. It is a fine addition to every physician's reference library.

H. W. Heupel, M.D., Ph.D.
Minneapolis, Minnesota

Health Care in a Doctor's Office*

IRVING ERSHLER, M.D.†

I AM INTERESTED in providing for people a much more thorough type of health program than is usually carried out in a doctor's office. I am concerned about the problems that people have in trying to get help from a doctor once they become sick with what we would call chronic disease of any sort. The most frequent and probably the most serious of these are cancer, heart trouble and emotional illness. With these three particularly, the results of treatment are often unsatisfactory. However, what many people do not understand is the fact that, once they get sick with chronic disease, the trouble they have in trying to get help from a doctor is due largely to the way they think about medical care. You go to see a doctor when you feel sick, but when you feel well it is not necessary. Chronic disease may begin very quietly in a person's body and is usually present for a long time before bothering a person at all. If we take cancer for an example, a person with cancer will usually go along for months, in some cases a year or longer, after the cancer starts growing in the body. During all, or most of this time, he feels well, looks well and would have no "reason" to see a doctor. Today with the availability of modern diagnostic or preventative medicine, if that person were examined during the early stage of cancer, examined thoroughly and I want to emphasize the word thoroughly, a surprisingly high percentage of cancer can be found at this early stage and can be cured with modern surgery, radiation, etc. Unfortunately, this doesn't usually happen. The reason is simply the way people think about medical care.

During the early curable stage of cancer, a person feels well, doesn't see any reason to go to a doctor, so nothing is done in the way of an examination. Cancer, like most chronic diseases is slowly progressive, gradually gets worse and finally reaches a stage that makes the person sick in some way. At this point a person feels that he should see a doctor. Diagnosis at this time is usually easy. However, in most cases, cure is

no longer possible. This is where the idea comes from that nothing can be done about cancer. This is why treatment of so many chronic diseases is still much poorer than it ought to be. This whole situation could be improved if we could get people to change their thinking about medical care and do several things that most people still don't do at all. They have to consult a doctor even though they feel perfectly well. They have to be examined thoroughly in spite of the fact that they feel well. In fact, the better they feel, the more thorough the examination should be, not the other way around, the way most people think.

The usual examination in a doctor's office is by no means thorough enough for this purpose and this is one way that I differ from most doctors so far as my office work is concerned. My office is arranged so that we can do all the tests that are practical to do in an office that may give us information about chronic disease of any type, and we do all these tests with every person that I take care of regardless of what their complaints may be. If a person were to come in and tell me he felt perfectly well and just wanted a "little check-up," he would get exactly the same examination as everyone else. This type of examination should be followed by a plan that would involve regularly scheduled examinations, even though a person felt entirely well. In other words, I feel that if a person is going to have the best medical care by modern standards, if he is going to be able to take advantage of what is available in the way of preventive medical care, and if he is just going to do what is possible to do to protect himself from getting into a hopeless situation with chronic disease, he has to follow a program of regular, thorough examining even though he feels well.

There is one other important factor in good medical care that I want to mention briefly and that is what I choose to call the services of a personal physician. I feel that the personal physician has to accept several responsibilities if he is to provide good medical care. To begin with, he should be the one to do the thorough examinations that I mentioned. Most doctors are so busy, they

*Verbatim Reproduction of Orientation Talk with all Prospective Patients.

†University of Utah Medical Center, Salt Lake City, Utah.

see so many patients in any one day, that the limitations of time alone make it impossible for the doctor with the usual type of office practice to do this type of work. This means then, if a doctor is going to accept the responsibilities of a personal physician, he has to be willing to limit his practice to a smaller group of patients compared to what most doctors see so that he will have time to carry out these thorough examinations. The personal physician should be someone whom patients can see at any time, between regularly scheduled examinations, so that they can discuss any problems that may occur on a day-to-day basis, regardless of what the problems may be, an ache, a pain, a cold or an emotional upset. The patient should be able to discuss such problems with the personal physician as they come along. I don't mean to imply that one doctor can treat everything. Medicine is getting more and more complicated. No one can do everything well. Doctors vary in the way they are trained. For example, in my own case, I don't do any surgery. I don't deliver babies. I don't do any nose and throat work. In spite of these limitations, I like to have my patients feel that I am their personal physician. Any time that they have any questions about themselves, they always have someone to talk to, someone whom they know and who knows them. If the problem is something that I can take care of, I am glad to do it. If it is something that I can't take care of, it is my responsibility to make sure that the patient is referred to the doctor who is best qualified to take care of that particular problem. People have difficulty finding out what any doctor is well trained to do. If they have a special problem, it is important that they get into the hands of the right doctor. This is what I mean by the role of the personal physician in medical care. This, plus a program of regular thorough examinations, are the things that are of importance in good medical care and what I try to do for people whom I take care of.

In order to provide this type of care, I have a regular plan that works out this way. A diagnostic study comes first. This just means as thorough an examination as it is possible to do in the office. It takes on the average of about four hours. The findings are discussed with the patient. He is told exactly what has been done, what the tests show, what the problems are and what can be done about them. Then I set up a regular schedule of follow-up examinations. The first

follow-up is at six months. This usually takes about an hour and a half. Once a year I repeat the original examination. A card is sent to remind the patient when it is time for the next scheduled examination. This will mean that every patient will be examined thoroughly and regularly, even though he feels entirely well. In between such examinations a patient is free to come in anytime he has a question about himself. I will take care of any problem I can. Or I will refer the patient to the doctor who is best qualified to take care of that particular problem.

This is the office plan that I use to provide the best possible medical care. It involves a good deal more thorough examining than most people have ever had. This is nothing more than what every person should have, even though they feel perfectly well, if they are going to have good medical care.

One other question that is frequently raised in regard to the problem of office practice based on a flat annual fee instead of the traditional fee-for-service basis is the question of over-utilization. This has never been a problem in my own practice. I would venture several possible explanations. All scheduled examinations are done thoroughly and unhurriedly; all findings are discussed in detail with patients and they are encouraged to raise questions about any problems. This is particularly important at the time of the initial diagnostic study. Patients frequently complain that the doctor does not discuss his findings with them or give them a chance to ask any questions. Another factor of importance is the encouragement given to patients to discuss emotional problems and the explanation to the patients, where appropriate, of the basis for symptoms in the absence of organic disease and the relationship of symptoms to emotional tension.

The above discussion, obviously written in the vernacular, was intended only as a personal record of the orientation talk with all new patients. The suggestion that it was worthy of publication was made by a member of the editorial staff of *MINNESOTA MEDICINE* who was aware of the type of practice that I carry out.

Several factors may be of additional interest. My practice is restricted to people who will accept this type of program. Over the years the amount of early asymptomatic potentially curable malignancy, particularly colon, cervix uteri, breast, thyroid, skin etc. that has been found is impressive.

HEALTH CARE IN A DOCTOR'S OFFICE

This is in addition to the not infrequent findings of previously undiagnosed hypertension, diabetes, chronic urinary tract infections, prostatic hyperrophy, early glaucoma, early cataracts etc. From his experience, the invariable question of justification on the basis of "yield" has been more than adequately answered. At the conclusion of the initial diagnostic study, a common comment from the patient is "This is the first time I have ever had a thorough exam." This experience plus an opportunity to discuss emotional problems which I routinely encourage is the basis for good rapport with patients resulting in an excellent doctor-patient relationship.

The following procedures are routinely carried out at the time of the initial diagnostic study and are repeated annually: complete history and physical examination with detailed report, chest fluoroscopy, six foot chest film, complete blood count, serial electrocardiograms (Masters test), sigmoidoscopic examination, sedimentation rate, icterus

index, urinalysis, Kahn test, stool occult blood, tonometer examination, Papanicolaou vaginal smears (females), multiphasic chemistry survey. In addition all patients over the age of 40 are advised to have a large bowel Xray periodically by a radiologist.

Another unusual feature of this health program is the fact that it is carried out on an annual flat-fee basis (not prepayment as the patient is allowed to budget the total cost over the entire year). The fee includes the initial diagnostic study and the follow-up exam at six months, all office calls and all office service provided during the year. I have never practiced on a fee-for-service basis for office care.

This approach to health care provides a comprehensive basis for 'primary care.' It is best carried out by an internist with broad rather than sub-specialty interest. All other necessary care should be ancillary care by the appropriate specialist under the direction of the personal physician.

Modern Concepts in Cancer Therapy

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Methodist Hospital and the Hennepin County Unit of the American Cancer Society

Wednesday, September 19, 1973

Methodist Hospital Auditorium

- 9:00- 9:05 Greetings from Methodist and the American Cancer Society
—John Brown, M.D., Chief of Staff
- 9:10 Service Programs of the American Cancer Society
—William Gamble, M.D.
Colon Cancer—Moderator—Richard Larson, M.D.
- 9:20- 9:50 Possibilities For Improving Survival In Colon Cancer
—Sanford Mackman, M.D., Surgery Staff of Jackson Clinic and Associate
Clinical Professor of Surgery, University of Wisconsin.
- 9:50-10:30 Case Presentations of Colorectal Cancer—David Kelsey, M.D.
PANEL DISCUSSION—Stanley Goldberg, M.D., John Brown, M.D.
Prostate Cancer—Moderator—Rodger Lundblad, M.D.
- 10:45-11:15 The Problem Of Advanced Prostatic Cancer—When And How To Treat
—Clyde E. Blackard, M.D., Chief of Urology, Veterans Administration
Hospital, Minneapolis, Minn.
- 11:15-12:00 Case Presentations of Prostatic Cancer—David Kelsey, M.D.
PANEL DISCUSSION—Clyde Blackard, M.D., Bruce Linderholm, M.D.,
Robert Green, M.D.
- 12:30- 1:30 lunch—courtesy of Methodist Hospital Staff
Ovarian Cancer—Moderator—Edward Maeder, Jr., M.D.
- 1:45- 2:15 A Systematic Approach To The Treatment of Ovarian Cancer
—C. Thomas Griffiths, M.D., Associate Professor, Department of Obstetrics/
Gynecology, Harvard Medical School
- 2:15- 3:00 Case Presentations of Ovarian Cancer—David Kelsey, M.D.
PANEL DISCUSSION—C. Thomas Griffiths, M.D., Gaius Slosser, M.D.,
Charles Murray, M.D.

FEATURE SPECIAL

Modern Concepts in Cancer Therapy

(Continued)

Breast Cancer—Moderator—William Gamble, M.D.

- 3:15- 3:45 Factors Affecting Survival In Breast Cancer
—Harry Bisel, M.D., Department of Oncology—Mayo Clinic
- 3:45- 4:30 Case Presentations of Breast Cancer—David Kelsey, M.D.
PANEL DISCUSSION—Harry Bisel, M.D., Glen Nelson, M.D., John Kelly, M.D.

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3430 List Place, St. Louis Park, Minnesota

- 6:30- 7:30 Social Hour
- 7:30- 8:30 Dinner—wives are cordially invited
- 8:30 Cancer U.S.A.—Outlook for the Future—Jesse L. Steinfeld, M.D., Chairman
Department of Oncology, Mayo Clinic

Application made to AAFP for 8 hours prescribed credit

Thursday, September 20, 1973
Methodist Hospital Auditorium

- 8:00 a.m. Gynecologic Tumor presentations by the OB/GYN Department of Methodist Hospital.

DISCUSSION—C. Thomas Griffiths, M.D.

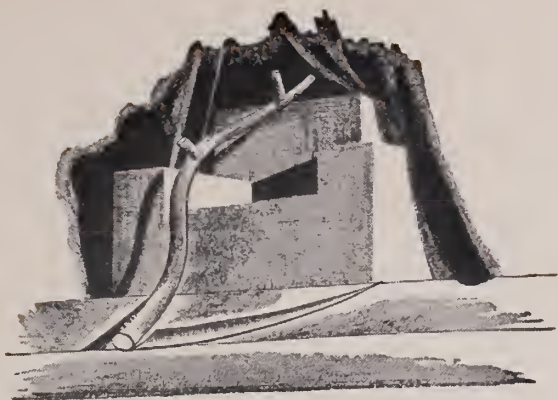
For information and dinner reservations call 929-1313, extension 501

Minnesota Society of Clinical Pathologists

Minnesota Society of Clinical Pathologists, Annual Tumor Seminar, November 10, 9 a.m. to 5 p.m., Minnesota Club, St. Paul. Program chairman: Edward Soule, M.D., Mayo Clinic, Rochester 55901 Speaker: Gerald Fine, M.D., Henry Ford Hospital, Detroit, Michigan, Slide Seminar.

Sixth Annual North Memorial OB-Gyn Symposium

On Friday, November 30, 1973, in Minneapolis, Minnesota, the Sixth Annual North Memorial Hospital OB-Gyn Symposium will be held. Selected speakers will discuss current topics of interest in our field. The Symposium will be followed the next day by the annual meeting of the Minnesota State Obstetrics and Gynecological Society. Inquiries should be directed to Alec Janes, M.D., Program Chairman, 601 Oakdale Medical Center, Mpls (55422).



In Memoriam

JOHN F. BILTZ, M.D.

Dr. John F. Biltz, 36, a radiologist on the staff of St. John's Hospital in Red Wing, was killed June 13, when his airplane crashed in a clover field near Prescott, Wisconsin. He was a graduate of the University of Minnesota Medical School.

Dr. Biltz was a member of the Radiological Society of North America, American Medical Association, Society of Air Force Internists and Allied Specialists, Bavarian-American Radiological Society, Minnesota State Medical Association and the Goodhue County Medical Society.

He is survived by his wife, Hannelore Helene, and three children.

JAMES W. REID, M.D.

Dr. James Reid, 54, South St. Paul physician, died June 17, while attending the Alaska State Veterans of Foreign Wars Convention at Sitka. He was a former national surgeon general of the Veterans of Foreign Wars.

Dr. Reid was a member of the Wakota County Medical Society, the American Medical Association and the Minnesota State Medical Association.

He is survived by his wife, Lota Jane, daughter, Mary, and sons, James, Phillip, Gregory and David.

IRA C. SKINNER, III, M.D.

Dr. Ira Skinner, 32, service member of the Minnesota State Medical Association, died February 23. He was a resident member of the Zumbro Valley Medical Society and the American Medical Association. At the time of his death, Dr. Skinner was in San Antonio, Texas.

CLIFFORD A. BOLINE, M.D.

Dr. C. A. Boline, 69, Battle Lake physician, died June 10, in Brownsville, Texas. He opened a general practice in Battle Lake in November, 1933, and served that community since that time. A graduate of the University of Minnesota Medical School, he interned at

the Charles T. Miller Hospital in St. Paul.

Dr. Boline was a former surgeon for the Northern Pacific Railway Company, a staff member of Wrights Memorial Hospital in Fergus Falls, and a member of the Park Region Medical Society, the American Medical Association and the Minnesota State Medical Association.

He is survived by his wife, Blanche and three sons, Alan, John and Robert.

WERNER J. LUND, M.D.

Dr. W. J. Lund, Staples physician and surgeon for the past 41 years, died June 28. He was 79 years of age.

His pre-medical schooling was taken at Loyola University in Chicago. While attending medical school at the University of Minnesota, he served as superintendent of the Northern Pacific Hospital in Brainerd. In 1932, he was transferred to Staples by the Northern Pacific Railway Company where he served as line surgeon and physician for the Railroad and the community.

He was a member of the Minnesota State Medical Association, the Upper Mississippi Medical Society, the American Medical Association and the National Association of Railway Surgeons.

Dr. Lund is survived by his wife, Myrtle and two daughters, Mrs. Phyllis Clabots and Miss Gloria Lund.

GRANT F. HARTNAGEL, M.D.

Dr. Grant F. Hartnagel, 63, Red Wing physician, died June 24. A graduate of the University of Minnesota Medical School, he took his internship at Milwaukee County Hospital, later returning to Red Wing to practice.

Dr. Hartnagel was certified by the American Board of Obstetrics and Gynecology and was a member of the Minnesota State Medical Association, the American Medical Association, the Minnesota Society of Obstetrics and Gynecology, the Goodhue County Medical Society and was a Fellow of the American College of Surgeons.

His wife, Elizabeth, and two daughters, Mrs. Thomas Sinkula and Jane Hartnagel, survive him.

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Warnings: Not of value in psychotic patients. Caution against hazardous occupations requiring complete mental alertness. When used adjunctively in convulsive disorders, possibility of increase in frequency and/or severity of grand mal seizures may require increased dosage of standard anti-convulsant medication; abrupt withdrawal may be associated with temporary increase in frequency and/or severity of seizures. Advise against simultaneous ingestion of alcohol and other CNS depressants. Withdrawal symptoms (similar to those with barbiturates and alcohol) have occurred following abrupt discontinuance (convulsions, tremor, abdominal and muscle cramps, vomiting and sweating). Keep addiction-prone individuals under careful surveillance because of their predisposition to habituation and dependence. In pregnancy, lactation or women of childbearing age, weigh potential benefit against possible hazard.

Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

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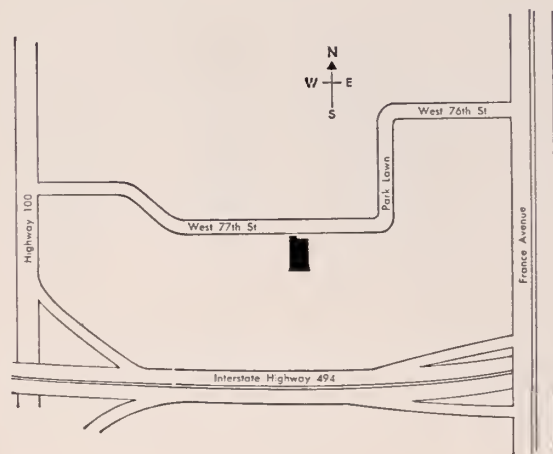
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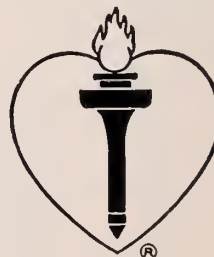
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**The Advertising
Pays for
Your Journal**



acute arthritic inflammation...heat that freezes

In acute rheumatoid arthritis consider Tandearyl. The anti-inflammatory action of Tandearyl quickly helps reduce heat, pain, swelling, and stiffness. Results are usually seen in 3 or 4 days. Try it for a week when the symptoms defy aspirin control.

Remember that Tandearyl is not a simple analgesic. It should not be used in patients responding to routine therapy. Before using, please read the prescribing information. It's summarized below.

Tandearyl® helps take the heat off phenylbutazone NF Geigy

tablets of 100 mg.

Important Note: This drug is not a simple analgesic. Do not administer casually. Carefully evaluate patients before starting treatment and keep them under close supervision. Obtain a detailed history, and complete physical and laboratory examination (complete blood count, urinalysis, etc.) before prescribing and at frequent intervals thereafter. Carefully select patients, avoiding those responsive to routine measures, contraindicated patients, and those who cannot be observed frequently. In patients not to exceed recommended dosage. Short-term relief of severe symptoms with the smallest possible dosage is the goal of therapy. Dosage should be taken with meals and a full glass of milk. Patients should discontinue the drug and report immediately any signs of fever, sore throat, oral lesions (symptoms of blood dyscrasia); dyspepsia, epigastric pain, symptoms of anemia, black or tarry stools or other evidence of intestinal ulceration or hemorrhage, skin reactions, significant weight gain or edema. A one-week trial period is adequate. Discontinue in the absence of a favorable response. Restrict treatment periods to one week in patients over sixty.

Indications: Acute gouty arthritis, rheumatoid arthritis, rheumatoid spondylitis.

Contraindications: Children 14 years or less; while patients; history or symptoms of G.I. inflammation or ulceration including severe, recurrent or persistent dyspepsia; history or onset of drug allergy; blood dyscrasias; renal, hepatic or cardiac dysfunction; hypersensitivity; thyroid disease; systemic edema; dermatitis and salivary gland enlargement due to drug; polymyalgia rheumatica and temporal arteritis; patients receiving other potent antirheumatic agents, or long-term antithrombotic therapy.

Warnings: Age, weight, dosage, duration of therapy, existence of concomitant diseases, concurrent potent chemotherapy affect incidence of toxic reactions. Carefully instruct and observe the individual patient, especially the aging (forty years and over) who have increased susceptibility to the toxicity of the drug. Use lowest effective dosage. Weigh the unpredictable benefits against po-

tential risk of severe, even fatal, reactions.

The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias, including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonylurea, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

Precautions: The following should be accomplished at regular intervals: Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activities requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

Adverse Reactions: This is a potent drug; its misuse can lead to serious results. Review detailed information before beginning therapy. Ulcerative esophagitis, acute and reactivated gastric and duodenal ulcer with perforation and hemorrhage, ulceration and perforation of large bowel, occult G.I. bleeding with anemia,

gastritis, epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, aplastic anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fatal and nonfatal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomata, aggravation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with overdosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement. (B)98-146-800-F (10/71)

For complete details, including dosage, please see full prescribing information.

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Division of CIBA-GEIGY Corporation
Ardsley, New York 10502



More than sleep

your choice of sleep medication
is wisely based on more than
sleep-inducing potential

sleep with relative safety

Chronic tolerance studies have confirmed the relative safety of (flurazepam HCl); no depression of cardiac or respiratory was noted in patients administered recommended or high for as long as 90 consecutive nights.

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sleep for 7 to 8 hours
without need to
repeat dosage

No sleep medication has been as rigorously evaluated in the sleep research laboratory as Dalmane. Insomnia patients given one 30-mg capsule of Dalmane at bedtime, on average: fell asleep within 17 minutes, had few awakenings, spent less time awake after sleep onset, and slept for 7 to 8 hours with no need for repeat dosage during the night.

leep with
sistency

enane (flurazepam HCl) is a distinctive sleep medication—a benzepine specifically indicated for insomnia. It is not a barbiturate or methaqualone, nor is it related chemically to any other hypnotic.

When your evaluation of insomnia indicates the need for a sleep medication, consider Dalmane—a single entity nonnarcotic, non-habit-forming agent proved effective and relatively safe for relief of insomnia.

Dalmane has been shown to be consistently effective even during consecutive nights of administration, with no need to increase dosage.

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(flurazepam HCl)

When restful sleep is indicated

One 30-mg capsule h.s. — usual adult dosage
(15 mg may suffice in some patients).

One 15-mg capsule h.s. — initial dosage for elderly or debilitated patients.

Before prescribing Dalmane (flurazepam HCl), please consult Complete Product Information, a summary of which follows:

Indications: Effective in all types of insomnia characterized by difficulty in falling asleep, frequent nocturnal awakenings and/or early morning awakening; in patients with recurring insomnia or poor sleeping habits; and in acute or chronic medical situations requiring restful sleep. Since insomnia is often transient and intermittent, prolonged administration is generally not necessary or recommended.

Contraindications: Known hypersensitivity to flurazepam HCl.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. Caution against hazardous occupations requiring complete mental alertness (e.g., operating machinery, driving). Use in women who are or may become pregnant only when potential benefits have been weighed against possible hazards. Not recommended for use in persons under 15 years of age. Though physical and psychological dependence have not been reported on recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage.

Precautions: In elderly and debilitated, initial dosage should be limited to 15 mg to preclude oversedation, dizziness and/or ataxia. If combined with other drugs having hypnotic or CNS-depressant effects, consider potential additive effects. Employ usual precautions in patients who are severely depressed, or with latent depression or suicidal tendencies. Periodic blood counts and liver and kidney function tests are advised during repeated therapy. Observe usual precautions in presence of impaired renal or hepatic function.

Adverse Reactions: Dizziness, drowsiness, lightheadedness, staggering, ataxia and falling have occurred, particularly in elderly or debilitated patients. Severe sedation, lethargy, disorientation and coma, probably indicative of drug intolerance or overdose, have been reported. Also reported were headache, heartburn, upset stomach, nausea, vomiting, diarrhea, constipation, GI pain, nervousness, talkativeness, apprehension, irritability, weakness, palpitations, chest pains, body and joint pains and GU complaints. There have also been rare occurrences of sweating, flushes, difficulty in focusing, blurred vision, burning eyes, faintness, hypotension, shortness of breath, pruritus, skin rash, dry mouth, bitter taste, excessive salivation, anorexia, euphoria, depression, slurred speech, confusion, restlessness, hallucinations, and elevated SGOT, SGPT, total and direct bilirubins and alkaline phosphatase. Paradoxical reactions, e.g., excitement, stimulation and hyperactivity, have also been reported in rare instances.

Dosage: Individualize for maximum beneficial effect. *Adults:* 30 mg usual dosage, 15 mg may suffice in some patients. *Elderly or debilitated patients:* 15 mg initially until response is determined.

Supplied: Capsules containing 15 mg or 30 mg flurazepam HCl.



ROCHE LABORATORIES
Div., Hoffmann-La Roche Inc.
Nutley, New Jersey 07110

Opinion & Dialogue

"Prescription drugs – who should determine the maker?"

Dispenser of Medicine

Clifton J. Latiolais
President
American
Pharmaceutical
Association



Maker of Medicine

C. Joseph Stetler
President
Pharmaceutical
Manufacturers
Association



"Too many doctors are dependent to the economic consequences of their decisions." So stated an issue of *Medical News Report* (December 4, 1972), an independent weekly newsletter published by AMA Chief Executive F. J. L. game, M.D.

Doctor, are you indifferent...

In discussing an anticipated increase in Blue Shield rates, *Blue Shield* magazine's newsletter had this to say: "In general, it can be said that we have given the impression that we are not particularly concerned with the increase in cost of health care to patients..."

"True, an MD's training is primarily scientific, but in the real world of practice, all of his scientific decisions have a price tag, or an economic impact. The economics of health care beckon the practitioner's attention. Concern for economics of medicine..."

When the pharmacist recommends that a drug product other than the one ordered be dispensed, the prescriber invariably permits the change when he feels the best interests of the patient will be served.

Shortcomings of Pro-Substitution Argument

The fact remains that it is necessary for the prescriber to know when the change is being contemplated and to be in a position to consent or demur. Without that opportunity, a unilateral decision of the pharmacist, made in the absence of clinical knowledge of the patient, could expose to needless risks, and in addition, jeopardize the relationship between the professions of Pharmacy and Medicine. In my view, there is nothing in the pro-substitution argument that offsets these risks.

The Issue of Drug Knowledge

Substitution advocates claim that the primary justification for changing the rules is the desire to better utilize pharmacists' knowledge about drugs. Yet the pharmacist's task to keep current on the entire field of drug therapy, to some extent, puts him at a disadvantage. Most often, a practicing physician with his expert knowledge of no more than

be an obligation of medical societies...
 Medical societies ought to continue campaigns to point out substantial savings that could be realized thru deductible insurance protection for catastrophic illnesses. At the very least, they should, in the patients' interest, question the role of any insurance organization that raises health care costs by forcing policyholders to buy insurance they may not need or want and probably won't ever use.
 Too many doctors are indifferent to the economic consequences of their decisions. Too many, for example, habitually hospitalize patients for the convenience of the MD. It's easy to deny such habits exist...
 Doctors, thru their medical societies, have unhesitatingly appealed to patients for support in the fight against government interference in the private practice of medicine. The public in the past has responded. It's time the American Medical Association and state and local medical societies paid off the debt by their action to hold down the cost of health care."

Drugs
 Insurance rates and hospital charges are only two factors in health

care costs. The cost of drugs—both prescription and nonprescription—is another.

And when it comes to drug costs, the nation's pharmacists are concerned. Through their national professional society, the American Pharmaceutical Association, pharmacists are advising the public to use nonprescription medication cautiously and conservatively, and to seek the advice of their pharmacist before selecting or purchasing such drugs.

Outdated Laws

The pharmacist also is aware that when it comes to prescription drugs, often he has an even greater opportunity to reduce the cost to the patient—with no sacrifice in the quality of the medication dispensed. But in many states, outdated and antiquated laws prevent the pharmacist from engaging in drug product selection. "Drug product selection" simply means that the pharmacist functions in the patient's interest by consciously choosing, from the multiple brands available, a low-cost quality brand of the specific drug to be dispensed in response to the physician's prescription order.

Much *misinformation* has been purposely spread by those who stand to gain financially by maintaining

high drug costs to the public. An endless stream of propaganda has emanated from the drug industry in an effort to persuade the medical profession that these so-called anti-substitution laws should be retained. And as long as these laws are retained, the drug industry will continue its current marketing practices which contribute unnecessarily to high drug costs to patients. These practices also are inviting government agencies to expand their restrictive controls on physicians and pharmacists.

APhA Efforts

As pharmacists, we are concerned about health care costs. We hope that every physician shares our concern on this vital issue, and will give his personal support to the constructive efforts APhA has undertaken in the interest of all patients.

(For a complete discussion of drug product selection, you are invited to request a free copy of the "White Paper on the Pharmacist's Role in Product Selection" from: American Pharmaceutical Association, 2215 Constitution Avenue, N.W., Washington, D.C. 20037.)

ugs that he selects to treat the only of conditions encountered in practice. Moreover, the physician's choice of a specific brand is based on his knowledge of the product's medical history and current reputation, and his experiences with the particular manufacturer's product.
 Some substitution proponents have argued that the dispensing of a drug is a simple two-party transaction between the pharmacist and the patient, and that a substitution by the pharmacist may avoid even a minimal breach of contract by simply informing the patient that he is making a substitution. I would judge that such arguments would be sympathetic to a pharmacist who substituted without physician approval and who took a legal defense that seeks to make the patient responsible for the pharmacist's actions.

Prescription Prices?

Substitution advocates are appealing to the consumer, and particularly the consumer activist, that reduced prescription prices could be a result of legalization of substitution. We have seen absolutely no evidence to support this claim. To the contrary, experience in Alberta, Canada, where substitution is authorized, suggests

the opposite.

Many pharmacists understandably are concerned about the cost of maintaining multiple stocks of similar products. While there is no doubt that inventory costs rise when additional brands are stocked, it would be interesting to know how much they rise, and how many pharmacists actually stock *all* brands—of, say, ampicillin or tetracycline—or how long they keep "slow moving" products on their shelves before they are returned for credit. To ask that the industry eliminate multiple sources is to ask competitors to stop competing.

Drug Substitution—A License for the Unethical

Anti-substitution repeal would favor "corner cutting" pharmacists and manufacturers. For them, free substitution would be not a right, but a license. As an aftermath, it is quite likely that the confidence of both physicians and patients in the profession of Pharmacy would be eroded, as revelations about the unconscionable behavior of an undisciplined few were magnified in the press or in professional circles.

Summary

In short, what the American Pharmaceutical Association advo-

cates as a broad-spectrum panacea looks to us to be not only a minority view (advocacy of substitution is by no means a uniform policy in Pharmacy), but also an extraordinarily costly and ineffective remedy, whose side effects are odious. We believe (1) that an impressive majority of pharmacists prefer to work with Medicine and with industry, for the consumer, and for the general good, (2) that they seek the privilege to substitute when the patient might gain and when the patient's doctor agrees, and (3) that they seek to work for the resolution of genuine grievances openly and professionally.

(For amplification of PMA views, please write for our booklet, "The Medications Physicians Prescribe: Who Shall Determine the Source?" It is available from: Pharmaceutical Manufacturers Association, 1155 Fifteenth Street, N.W., Washington, D.C. 20005.)

Pharmaceutical
 Manufacturers Association
 1155 Fifteenth Street, N.W.
 Washington, D.C. 20005



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BACTRIMTM

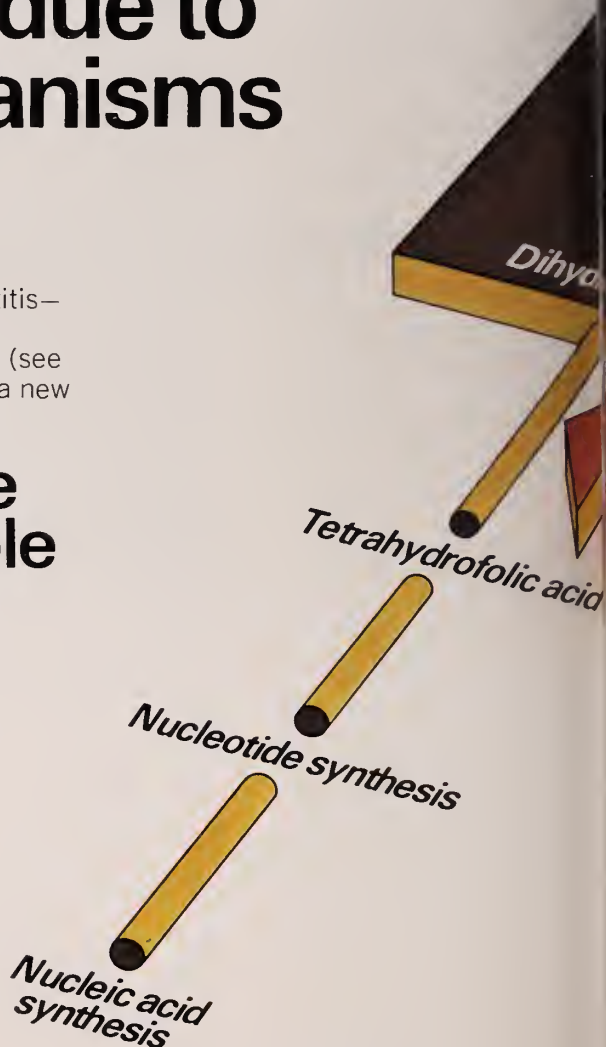
Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

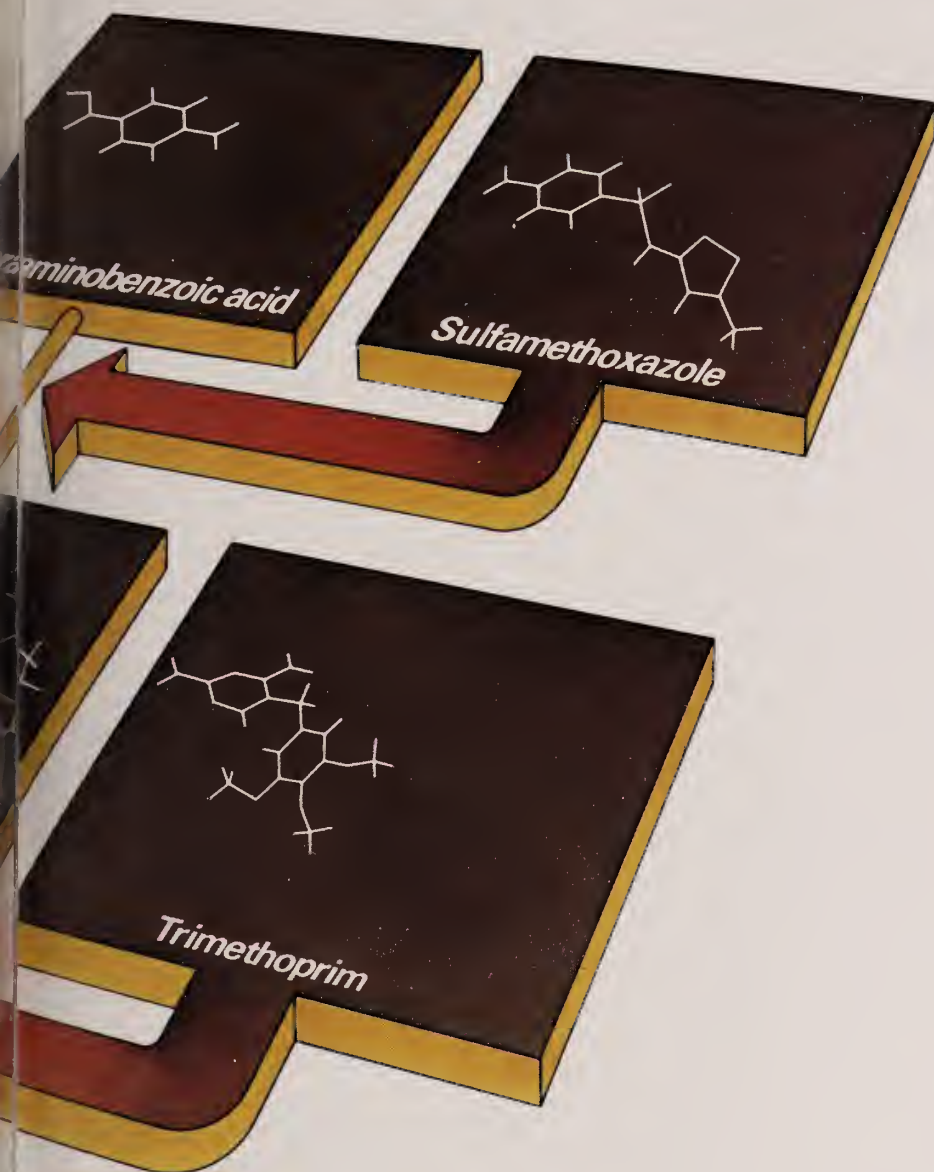
a new type of antibacterial for a two-pronged attack against chronic urinary tract infections due to susceptible organisms

Bactrim is highly effective in the treatment of these infections—primarily pyelonephritis, pyelitis and cystitis—when due to susceptible organisms. This efficacy is related to the unique mode of action against bacteria (see illustration), an action that, in effect, makes Bactrim a new type of antibacterial.

Bactrim interrupts the life cycle of susceptible bacteria

Unique mode of action interrupts the life cycle at two important points, thereby impeding the production of nucleic acids and proteins essential to these bacteria. These consecutive interruptions occur because sulfamethoxazole and trimethoprim resemble naturally existing substrates. By competitive replacement of these substrates, they inhibit further synthesis.





new **BACTRIM**TM

Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

for chronic urinary tract infections

Before prescribing, please see complete product information on last page of advertisement.

Excellent clinical response in chronic urinary tract infections even with obstructive complications

A multiclinic, double-blind study* of response to a ten-day course of therapy in 471† patients with chronic urinary tract infections demonstrated the superiority of Bactrim. On the 10th day after initiation of therapy, 91.7% (of 168 patients) showed significant bacteriological response to Bactrim, compared with 81.2% (of 144 patients) to trimethoprim and 64.5% (of 155 patients) to sulfamethoxazole. More than half of these patients had obstructive complications.

Excellent response maintained

Bactrim proved equally impressive in maintaining this bacteriological response. In the above study, after a ten-day course of therapy with Bactrim, 68.4% of patients with chronic urinary tract infections *maintained* response for up to 42 consecutive days, compared with 59.7% with trimethoprim and 44.4% with sulfamethoxazole. These results are particularly noteworthy considering the number of patients with obstructive complications—cases regarded as being notoriously difficult to treat.

Prescribing considerations

Clinical Limitations: Currently, the increasing frequency of resistant organisms is a limitation on the usefulness of all antibacterial agents, especially in the treatment of chronic and recurrent urinary tract infections. Not recommended for children under twelve.

Contraindications: Hypersensitivity to trimethoprim or sulfonamides. Pregnancy and during the nursing period.

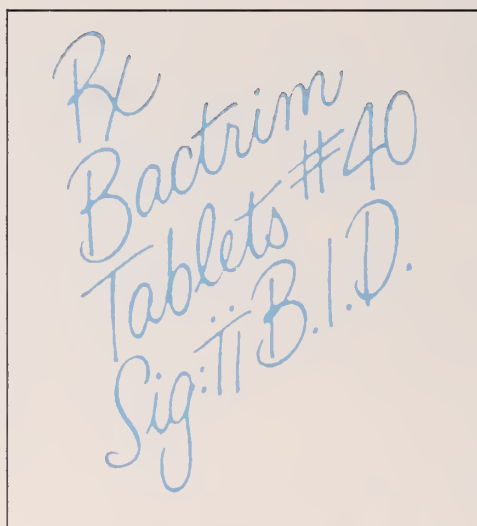
Warnings and Precautions: Both sulfamethoxazole and trimethoprim have been reported to interfere with hematopoiesis. Complete blood counts should be done frequently. If a significant reduction in the count of any formed blood element is noted, Bactrim should be discontinued. Bactrim should be given with caution to patients with impaired renal or hepatic function, possible folate deficiency, severe allergy or bronchial asthma. Maintain adequate fluid intake. Urinalyses with careful microscopic examination and renal function tests should be performed during therapy, particularly for those patients with impaired renal function.

Adverse Effects: Among the most common side effects are nausea, vomiting, rash, leukopenia and elevations in SGOT and creatinine.

Usual adult dosage: two tablets every twelve hours for 10 to 14 days; no loading dose required.

*Data on file, Hoffmann-La Roche Inc., Nutley, N.J. 07110

†4 patients not available for evaluation at day 10.



new **BACTRIM**TM

Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

for chronic urinary tract infections



Roche Laboratories
Division of Hoffmann-La Roche Inc.
Nutley, N.J. 07110

Product Information:

Indication: Bactrim is a synthetic antibacterial combination product available in scored light-green tablets, each containing 80 mg trimethoprim and 400 mg sulfamethoxazole.

Chemical: Trimethoprim is 2,4-diamino-5-(3,4,5-trimethoxybenzyl) pyrimidine. It is a white to light-yellow, odorless, bitter compound with a molecular weight of 290.3.

Sulfamethoxazole: is *N*-(5-methyl-3-isoxazolyl)sulfanilamide. It is a white to light-yellow, odorless, tasteless compound with a molecular weight of 253.28.

Microbiology: Sulfamethoxazole inhibits bacterial synthesis of dihydrofolic acid by competing with *para*-aminobenzoic acid. Trimethoprim blocks the production of tetrahydrofolic acid from dihydrofolic acid by binding to and reversibly inhibiting the required enzyme, dihydrofolate reductase. Thus, Bactrim blocks two consecutive steps in the biosynthesis of nucleic acids and proteins essential to many bacteria.

Resistance: Studies have shown that bacterial resistance develops more slowly with Bactrim than with trimethoprim or sulfamethoxazole alone.

Spectrum: Serial dilution tests have shown that the spectrum of antibacterial activity of Bactrim includes the common urinary tract pathogens with the exception of *Pseudomonas aeruginosa*. The following organisms are usually susceptible: *Escherichia coli*, *Klebsiella-Enterobacter*, *Proteus mirabilis* and indole-positive proteus species.

Representative Minimum Inhibitory Concentration Values for Bactrim-Susceptible Organisms
(MIC—mcg/ml)

	Trimethoprim alone	Sulfamethoxazole alone	TMP/SMX (1:20) TMP	SMX
<i>Escherichia coli</i>	0.05—1.5	1.0 —245	0.05—0.5	0.95— 9.5
<i>Staphylococcus spp.</i>	0.5 —5.0	7.35 —300	0.05—1.5	0.95—28.5
<i>Streptococcus spp.</i>	0.5 —1.5	7.35 — 30	0.05—0.15	0.95— 2.85
<i>Enterobacteriaceae</i>	0.15—5.0	0.735—245	0.05—1.5	0.95—28.5

Pharmacology: Bactrim is rapidly absorbed following oral administration. The blood levels of trimethoprim and sulfamethoxazole are similar to those achieved when each component is given alone. Peak blood levels for the individual components occur one to two hours after oral administration. The half-lives of sulfamethoxazole and trimethoprim, 10 and 16 hours respectively, are relatively the same regardless of whether these compounds are administered as individual components or as Bactrim. Detectable levels of trimethoprim and sulfamethoxazole are present in the blood 4 hours after drug administration. Free sulfamethoxazole and trimethoprim blood levels are proportionately dose-dependent. After repeated administration, the steady-state ratio of trimethoprim to sulfamethoxazole levels in the blood is about 1:20.

Protein Binding: Sulfamethoxazole exists in the blood as free, conjugated and protein-bound forms; trimethoprim is present as free, protein-bound and protein-bound forms. The free forms are considered to be the biologically active forms. Approximately 44 percent of trimethoprim and 70 percent of sulfamethoxazole are protein-bound in the blood. The presence of 10 mg percent sulfamethoxazole in plasma does not influence the protein binding of trimethoprim. The protein binding of trimethoprim does not influence the protein binding of sulfamethoxazole.

Excretion: Excretion of Bactrim is chiefly by the kidneys through both glomerular filtration and tubular secretion. Urine concentrations of both sulfamethoxazole and trimethoprim are considerably higher than plasma concentrations in the blood. When administered together as Bactrim, neither sulfamethoxazole nor trimethoprim affects the urinary excretion pattern of the other.

Indications: Chronic urinary tract infections (primarily pyelonephritis and cystitis) due to susceptible organisms (usually *Escherichia coli*, *Klebsiella-Enterobacter*, *Proteus mirabilis*, and, less frequently, indole-positive proteus species).

Contraindications: Currently, the increasing frequency of resistant organisms limits the usefulness of all antibacterial agents, especially for the treatment of chronic and recurrent urinary tract infections.

Warnings: Hypersensitivity to trimethoprim or sulfonamides. Caution during the nursing period (see Reproduction section).

Adverse Reactions: Deaths associated with the administration of sulfonamides have been reported from hypersensitivity reactions, agranulocytosis, aplastic anemia and other blood dyscrasias. Experience with trimethoprim alone is much more limited, but it has been reported that there was hematopoiesis in occasional patients. In elderly patients concurrently receiving certain diuretics, primarily thiazides, an increased incidence of thrombopenia with purpura has been reported.

The presence of clinical signs such as sore throat, fever, pallor, purpura or jaundice may be early indications of serious blood disorders. Complete blood counts should be done frequently in patients receiving Bactrim. If a significant reduction in the count of any formed blood element is noted, Bactrim should be discontinued.

At the present time, there is insufficient clinical information on the use of Bactrim in infants and children under 12 years of age to recommend its use.

Precautions: Bactrim should be given with caution to patients with impaired renal or hepatic function, to those with possible folate deficiency and to those with severe allergy or bronchial asthma. In glucose-6-phosphate dehydrogenase-deficient individuals, hemolysis may occur. This reaction is frequently dose-related. Adequate fluid intake must be maintained in order to prevent crystalluria and stone formation. Urinalyses with careful microscopic examination and renal function tests should be performed during therapy, particularly for those patients with impaired renal function.

Adverse Reactions: For completeness, all major reactions to sulfonamides and to trimethoprim are included below, even though they may not have been reported with Bactrim.

Blood dyscrasias: Agranulocytosis, aplastic anemia, megaloblastic anemia, thrombopenia, leukopenia, hemolytic anemia, purpura, hypoprothrombinemia and methemoglobinemia.

Allergic reactions: Erythema multiforme, Stevens-Johnson syndrome, generalized skin eruptions, epidermal necrolysis, urticaria, serum sickness, pruritus, exfoliative dermatitis, anaphylactoid reactions, periorbital edema, conjunctival and scleral injection, photosensitization, arthralgia and allergic myocarditis.

Gastrointestinal reactions: Glossitis, stomatitis, nausea, emesis, abdominal pains, hepatitis, diarrhea and pancreatitis.

C.N.S. reactions: Headache, peripheral neuritis, mental depression, convulsions, ataxia, hallucinations, tinnitus, vertigo, insomnia, apathy, fatigue, muscle weakness and nervousness.

Miscellaneous reactions: Drug fever, chills, and toxic nephrosis with oliguria and anuria. Periarthritis nodosa and L. E. phenomenon have occurred.

The sulfonamides bear certain chemical similarities to some goitrogens, diuretics (acetazolamide and the thiazides) and oral hypoglycemic agents. Goiter production, diuresis and hypoglycemia have occurred rarely in patients receiving sulfonamides. Cross-sensitivity may exist with these agents. Rats appear to be especially susceptible to the goitrogenic effects of sulfonamides, and long-term administration has produced thyroid malignancies in the species.

Dosage and Administration: Not recommended for use in children under 12 years of age.

The usual adult dosage is two tablets every 12 hours for 10 to 14 days.

For patients with renal impairment:

Creatinine Clearance (ml/min)	Recommended Dosage Regimen
Above 30	Usual standard regimen
15-30	2 tablets every 24 hours
Below 15	Use not recommended

How Supplied: Tablets, containing 80 mg trimethoprim and 400 mg sulfamethoxazole—bottles of 100 and 500; Tel-E-Dose® packages of 1000; Prescription Paks of 40, available singly and in trays of 10. Imprint on tablets: ROCHE 50.

Reproduction Studies: In rats, doses of 533 mg/kg sulfamethoxazole or 200 mg/kg trimethoprim produced teratological effects manifested mainly as cleft palates. The highest dose which did not cause cleft palates in rats was 512 mg/kg sulfamethoxazole or 192 mg/kg trimethoprim when administered separately. In two studies in rats, no teratology was observed when 512 mg/kg of sulfamethoxazole was used in combination with 128 mg/kg of trimethoprim. However, in one study, cleft palates were observed in one litter out of 9 when 355 mg/kg of sulfamethoxazole was used in combination with 88 mg/kg of trimethoprim.

In rabbits, trimethoprim administered by intubation from days 8 to 16 of pregnancy at dosages up to 500 mg/kg resulted in higher incidences of dead and resorbed fetuses, particularly at 500 mg/kg. However, there were no significant drug-related teratological effects.

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President's Letter

ON AUGUST 1, 1973, HOUSE FILE 286 and Senate file 384 became if not the law of the land at least the law of our beautiful Minnesota. House and Senate files 286 and 384 are also known as "The Patient's Bill of Rights." It requires hospitals and nursing homes to hand each patient a piece of paper on which are inscribed those rights which we learned about long ago at our mother's knee, from our father's discipline and later from the admonitions of our teachers, friends and families. We call this code, "good manners" or "common courtesy" or "being polite." In ordinary relationships it is the essence of socialization. In a health care setting, it is the doctor-patient relationship. In the words of Leo Alexander* "The patient and his doctor trusting each other, forming with solidarity an alliance against illness."

Such things as privacy, confidentiality, courtesy and mutual respect all derive from man's humanity rather than from legislative edict. Where in our state are such rules of good manners violated that the legislature must insure them by law? Are we unable to carry out the ancient precepts of our forebears and teachers.

Perhaps at times we have all observed violations of good conduct. One of the disheartening experiences of my youth was to observe the decline of common courtesy within the military system. Some men who in civilian life had been the soul of courtesy somehow in the military underwent a deterioration of their humanity, and developed a cavalier attitude toward such things as privacy, confidentiality and respect. I keenly remember the crudity of pre-embarkation preparations at good old Camp Parks just over the hills from Berkeley, California. Those GI's were herded into a huge open gymnasium-like room, their clothes removed, their privacy impaled on the sword of military necessity and, naked, fearful, and sweating, were pushed through what was euphemistically called a physical examination. I believe the record was 1500 men in one six-hour period. That day ended with the auditorium filled with the acrid smell of frightened sailors and weary, disheartened, and disillusioned medical officers. Fortunately that sort of discourtesy was

not universal and even in the military many a civilian turned sailor struggled to apply comity and dignity to his dealings with patients.

Our civilian efforts in which we exercise some manner of control are quite different. The doctor-patient relationship is attended by mutual respect, courtesy, diligence and dignity. The Patient's Bill of Rights is superfluous in our system for we have long since learned that in an atmosphere of decorum and confidentiality and especially in an atmosphere of open communication, good medical care is the rule. Are some patients' rights violated? In some ways the system does discriminate against him. Where, for example, is the privacy of person when a clerk at the office reads the insurance report containing much that is personal. Where is the confidentiality when the superintendent of schools or the sales manager or the shop foreman is privy to all sorts of details of his employee's illness? Where is the dignity when an agency of government insists on minute details of diagnosis and treatment purportedly to authorize payment and where is respect when at times payment is retrospectively denied. Soon pre-admission authorization will be the way of doing business. Shades of Big Brother! Is this a system which guarantees dignity and insures humanity, or is it rather a system which erodes the very rights Senate file 384 has set out to protect—a system in which third parties be they employers or insurance carriers or government agencies intrude into a private relationship. And what about the doctor who is forced to participate in this destruction of dignity. Will he be able to continue in the face of such grossness to be the protecting and benevolent figure needed at times of illness? What can he do to protect himself from the degrading influence of such basic discourtesy. Perhaps what we need is a Bill of Rights for Physicians, a bill of rights to guarantee the physician an opportunity to treat his patient with the kind of respect each patient deserves.



President
Minnesota State Medical Association

*Psychiatrist, Tufts University Medical School in Medford, Mass.

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Flexible Fiberoptic Bronchoscopy

SAMUEL E. STUBBS, M.D.* and EDWARD C. ROSENOW III, M.D.*

THE DEVELOPMENT OF the flexible fiberoptic bronchoscope (FFB) with a remote-controlled tip marked the beginning of a new era in the diagnosis and treatment of pulmonary disease. Following the discovery those small fiberglass threads arranged in a precise bundle—even in a flexed position—could transmit light and relay an image, the application of this principle to endoscopy significantly extended the range of visibility obtainable with conventional rigid instruments. Although reports of the development of semiflexible instruments for use in gastroscopic procedures appeared as early as 1936,¹ the first practical flexible bronchoscopes did not become available in this country until 1968 when Ikeda et al.,² working with the Machida Endoscope Co., Ltd., and Olympus Optical Co., Ltd., in Japan, pioneered the development of flexible fiberoptic bronchoscopy and its application to pulmonary endoscopic procedures.²

In 1969 we began using the FFB at the Mayo Clinic and, currently, we find it applicable in approximately 50% of our bronchoscopic procedures. In 1972 we used it in approximately 500 examinations. Although the conventional rigid bronchoscope is still important in both diagnostic and therapeutic bronchoscopy, we believe that the FFB can be an important addition to a well-organized and well-equipped endoscopy service.

Indications and Advantages

Indications

Common indications for diagnostic bronchoscopic examination are listed in the Table. With some exceptions the indications for use of the FFB are similar to those for the rigid bronchoscope. Therapeutic bronchoscopy appears to impose the greatest number of limitations on the use of the FFB.

Foreign bodies, with perhaps the rare exception of a straight pin, cannot be removed from the tracheobronchial tree by means of the FFB.

*Mayo Clinic and Mayo Foundation, Rochester, Minnesota.
See editorial, page 869.

Dilation of tracheobronchial strictures and trans-bronchoscopic lung biopsy also are not possible with the FFB.³

In cases of hemorrhage, Sackner et al.,⁴ stated that they could control bleeding by cold saline lavage and topical application of epinephrine. However, in cases of definite bleeding, we have been reluctant to use the FFB without rigid bronchoscopy. Profuse bleeding may be difficult to control, suctioning through the small channel of the flexible bronchoscope may be ineffective, and blood may obscure vision with the FFB. Hence, when bleeding is a major problem or when we anticipate obtaining a biopsy specimen from a lesion that appears to be vascular, we prefer the rigid bronchoscope. Obviously vascular structures are preferably not biopsied.

The aspiration of mucous plugs and retained secretions is often effective treatment of post-operative atelectasis and the removal of secretions prior to bronchography may permit a better quality of roentgenograms. Wanner and associates⁵ found that use of the FFB in conjunction with saline lavage was effective in the aspiration of thick, retained secretions. Our experience has been that most often such secretions can be removed most readily by direct aspiration through the rigid bronchoscope. The principal limitation to success with the FFB is the small channel through which secretions can be aspirated.

TABLE

Indications for Diagnostic Bronchoscopy

Persistent cough
Hemoptysis
Stridor
Localized wheezing
Abnormal thoracic roentgenogram
Abnormal sputum cytology
Pleural effusion
Diaphragmatic paralysis
Vocal cord paralysis
Diffuse parenchymal lung disease (with lung biopsy)
Bronchiectasis
Foreign body in bronchi
Mediastinal lesions
Brushing of peripheral lesions
Metastasis from unknown primary tumor
Upper esophageal lesions

In the management of lung abscesses that do not drain spontaneously into the tracheobronchial tree, bronchoscopy with the rigid bronchoscope is an accepted therapeutic procedure. An aspirating tip can be introduced through the bronchoscope to facilitate drainage if necessary. Currently, our experience with the FFB for this purpose is too limited to permit us to give a firm opinion.

Advantages

Despite the limitations to its use, the FFB has distinct advantages over the rigid bronchoscope. The major contribution of the FFB to endoscopy is an extension of the range of visibility, especially in the upper lobes. The flexible remote-controlled tip permits the instrument to be inserted sufficiently far to allow the bronchoscopist to see within the subsegmental bronchi. The depth of insertion is often limited only by the size of the instrument, permitting adequate inspection despite significant distortion, displacement, or stenosis of the bronchi.

Other reasons for the increasing popularity of use of the flexible bronchoscope are the lack of discomfort for the patient and its tolerance even by very ill patients. There is no need to hyperextend the neck and little or no possibility of endotracheal perforation. It is sometimes necessary to repeat bronchoscopy in patients examined initially by rigid instruments; in such an eventuality, any reluctance of patients to undergo another procedure frequently can be overcome by choosing the flexible instrument for the second examination.

Method of Bronchoscopy

Equipment

We use three different bronchoscopes. The FFB we use most often, the Olympus BF-5B, is illustrated in Figure 1. Its main features are a working length of 55 cm and a diameter of 5 mm,

an arc of flexion of the distal end of $+130^\circ$ to -30° , and a channel 1.5 mm in diameter through which local anesthetics and lavage solutions can be instilled or secretions aspirated. The light bundle is illuminated by a halogen cold-light supply (model CLE). An abrasive brush on a flexible wire can be inserted when brush biopsies are required. Another bronchoscope, the Olympus BF-5B2, has a working channel 1.76 mm in diameter through which delicate flexible forceps can be passed for biopsy of lesions under direct vision. The third instrument, manufactured by the Machida Endoscope Co., Ltd., has an additional feature which permits rotation of the distal tip in addition to flexion and extension. All of these instruments can be equipped with cameras for still or motion photography or for the transmission of closed-circuit television.

The bronchoscopes are sterilized cold by means of a combination of mechanical cleaning with a brush for the channel (supplied by the manufacturer) and use of 2% PVP-I (Betadine) solution. Lens cleaner, containing antifogging ingredients is applied to the objective lens and gently removed with gauze.

Preparation of the Patient

Currently, all examinations except those done at the patient's bedside are done in endoscopy rooms located near the operating rooms. Many patients are examined as outpatients and they do not stay in the hospital overnight. Any patient whose examination requires general anesthesia is kept overnight for observation.

The meal immediately prior to the procedure is withheld. For premedication, commonly meperidine (50 mg) and atropine (0.6 mg) are given by intramuscular injection before the patient goes to the endoscopy room. Dosages may vary depending on the clinical status of the patient or evidence of drug hypersensitivity.

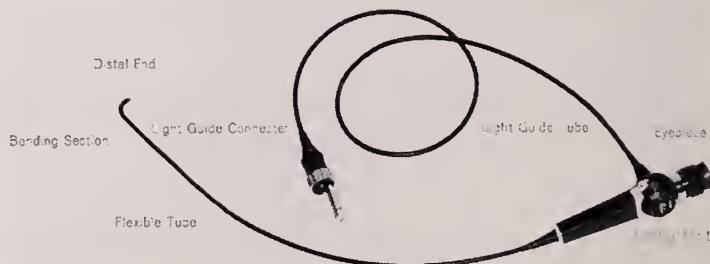


Fig. 1—Flexible fiberoptic bronchoscope (Olympus BF-5B).

(From Rosenow, EC 111, Hughes, RW Jr.: Progress in bronchoesophageal endoscopy. Surg Clin 53:775, 1973. By permission of W. B. Saunders Company.)

For topical anesthesia, Cetacaine (Cetylite Industries, Inc.) is sprayed over the oropharynx, epiglottis, and larynx. With the patient's tongue held extended, two or three one-second applications are usually all that are required. Then, five ml of 4% lidocaine solution are instilled into the trachea with a syringe and curved metal cannula; for this part of the procedure, the patient holds his tongue extended and a laryngeal mirror is used for indirect visualization as the lidocaine solution is dripped first on and then through the vocal cords. Topical anesthesia is then complete.

The use of a good technique and avoidance of haste in the preparation of the patient allow the patient to be comfortable and obviate the need for excessive amounts of topical anesthetic to prevent coughing during the subsequent examination.

Application of local anesthetic by means of an ultrasonic nebulizer also may be an effective method of anesthetizing the entire respiratory tract.⁶

The patient is then led or taken by a cart to the examining table, where he is placed in a comfortable supine position. A restraint may be placed across the legs to prevent accidental falls from the table. The patient's eyes are then protected by gauze pads and a towel secured with towel clips. If sedation is necessary, diazepam, which has been shown to be an excellent premedication for bronchoscopic procedures,⁷ may be injected intravenously if the endoscopist thinks that desirable. We do not use it routinely, but find it helpful in long examinations or with anxious patients.

Insertion of Bronchoscope

The endoscopist may use one of several techniques

for insertion of the FFB. First, it can be passed through the rigid bronchoscope. For example, the results of conventional bronchoscopy may be negative in a patient with sputum that is positive for malignant cells. The FFB can then be inserted through the rigid instrument and, in some cases, successfully used to enable the bronchoscopist to see a small lesion that is beyond the range of the bronchoscope-telescope system. When a lesion is seen it can be biopsied, brushed, or curetted for histologic or cytologic study. Bronchial washings can also be obtained for cytologic study or appropriate cultures.

Second, the FFB can be inserted through an oral endotracheal tube; repeated withdrawal and introduction of the FFB is well-tolerated by patients. Bronchoscopy can be performed with the patient seated or supine, as an outpatient procedure, or at the bedside of an ill patient. Similarly, the FFB can be inserted through a tracheostomy tube or tracheostomy stoma.

Third, the FFB can be inserted through the transnasal route.⁸ This may be a convenient approach if examination only is necessary, but it is less suitable if repeated entry and withdrawal are required. We prefer to withdraw the FFB after brushing and to remove the brush from the distal end of the working channel in order to make smears from the brush. This avoids the dislodging of material that would occur if the brush were pulled through the working channel from the proximal end of the FFB. The FFB also may have to be withdrawn for cleaning the tip. Each reinsertion by way of the transnasal route would require passage of the bronchoscope through the vocal cords under direct vision.

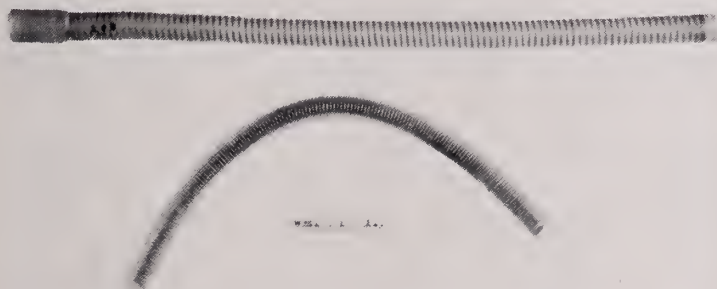


Fig. 2—Uncuffed endotracheal tube with integral wire spiral.

(From Rosenow, EC III, Hughes, RW Jr.: *Progress in bronchoesophageal endoscopy*. Surg Clin 53:775, 1973. By permission of W. B. Saunders Company.)

Insertion through Endotracheal Tube

Most examinations are performed using a soft rubber, integral wire spiral, uncuffed endotracheal tube (Figure 2). The FFB is lubricated with clear lidocaine jelly and the endotracheal tube is threaded over the full working length of the FFB to the proximal end. The patient may then be asked to hold an oval plastic mouth guard between the teeth or gums as an additional safeguard to prevent damage to the bronchoscope's delicate fiberglass bundles. The patient can then be approached from either side or from the head, depending on the preference of the endoscopist. The lights are dimmed and the tip of the FFB is passed behind the tongue and epiglottis and through the vocal cords into the trachea under direct vision. At this time, the appearance of the larynx, vocal cords, and subglottic area can be examined and the mobility of the vocal cords determined.

Once the distal one-third of the FFB has passed into the trachea, the endotracheal tube is lubricated with lidocaine jelly and guided over the FFB into the trachea and secured with adhesive tape. Sometimes a gentle spiral or twisting motion of the endotracheal tube over the FFB is necessary in order to facilitate passage of the tube through the larynx and vocal cords. Infrequently, the endoscopist may choose to insert the endotracheal tube when the patient is prepared, using the laryngeal mirror for visualization of the vocal cords. We find that the former method is well accepted by the patient and easy to perform, and we thus prefer it to direct laryngoscopy for intubation or the transnasal approach. It is obvious that an endotracheal tube is not always necessary if the endoscopist wishes to perform a limited examination or, if withdrawal and reinsertion of the FFB are necessary, he does not mind repeatedly passing the instrument through the vocal cords into the trachea. There is an increased risk of damage to the fiberglass bundles, however, should the patient bite the instrument.

If supplemental oxygen is required, an adapter with a close-fitting perforated diaphragm and a side-arm for attachment of anesthesia equipment may be used. This adapter can be used effectively for the administration of general anesthesia, if desired.

Examination

With the endotracheal tube in place, the trach-

eobronchial tree can be examined carefully and unhurriedly. If additional anesthesia is required to control coughing, 0.5- to 1.0-ml doses of 4% lidocaine can be instilled through the working channel. Secretions can be aspirated directly or after lavage with five to 10 ml of sterile saline. If the aspirate is to be collected for culture or cytologic study, a trap bottle is used.

If lesions can be seen, delicate flexible forceps can be inserted for biopsy under direct vision or an abrasive brush can be swept onto the lesion to take smears for cytologic study. The brush can also be used to take material for culture. As the FFB is withdrawn following repeated brushings, additional lubrication of the scope with lidocaine jelly will facilitate reinsertion. Fluoroscopic guidance may be necessary for accuracy, particularly if peripheral, nonvisualized lesions are to be brushed. A good time to lavage and collect the aspirate for study would appear to be following the brushing of a lesion.

Other Applications of Flexible Fiberoptic Bronchoscopy

New applications of flexible fiberoptic bronchoscopy are constantly being developed. The FFB has been used for selective catheter placement for the purpose of bronchography, lobar lung lavage and gas sampling.⁴ It has been used in the study of patients with respiratory failure who require prolonged mechanical ventilation.^{9,10} The FFB has also been used in studying bacterial infection of the lower respiratory tract, special techniques of collection of secretions being made possible by use of this instrument.⁵

When smaller instruments become available more extensive examination of the peripheral bronchi will be possible. This may have an important impact on attempts to detect lung cancer at an early stage. We have used the FFB for esophagogastroscope in infants, since no infant gastroscope is available. A syringe filled with air can be used to insufflate air into the stomach for better visualization.

The FFB has permitted us to make bronchoscopic examinations of patients in whom examination is difficult or impossible with the rigid instruments, either because of anatomical abnormalities or cervical spine disorders that make hyperextension of the neck undesirable or impossible. By means of the technique that we have described the FFB can be used effectively in the intubation of patients for general anesthesia who otherwise

might require a tracheostomy because of a fractured cervical spine, ankylosed cervical spine, or some other abnormality. In this instance, use of the FFB permits application of the topical anesthetic before intubation while the patient is

awake and before general anesthesia is induced. A cuffed flexible endotracheal tube is threaded over the FFB, which acts as a guide. Recently, a smaller flexible fiberoptic instrument was developed especially for this purpose.¹¹

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Sganarelle: We great doctors, we know these things right away. An ignorant man would be embarrassed, and you'd have to say: It's this, it's that; but me, I hit the target first shot, and I tell you your daughter is mute.

Geronte: Yes; but I'd like it very much if you could tell me what causes it.

Sganarelle: Nothing easier. It's caused by her loss of speech.

Geronte: Very good; but, if you please, what causes her loss of speech?

Sganarelle: All our best authorities will tell you that it's an impediment in the movement of the tongue.

Geronte: Well, still, what do you think about that impediment in the movement of the tongue?

Sganarelle: Aristotle, on that subject, says—many fine things . . . You don't understand Latin?

Geronte: No.

Sganarelle: *Cabricias arci thuram, catalamus, singulariter, nominativo, haec musa* (the muse), *bonus, bona, bonum*.*

*Moliere: *The Doctor In Spite of Himself*. Act II Scene vi. 1666.

Meetings

October 20—Minnesota Society of Internal Medicine, Semi-annual Meeting, and Regional Meeting. American College of Physicians. Howard Horns. "Governor of Minnesota." 8 a.m., Program Chairman: David Dines, M.D., Mayo Clinic, Rochester, Minn. 55901. Mann Hall, Medical Science Bldg., Rochester.

November 9—Minnesota Dermatological Society, Quarterly Clinical Meeting, St. Paul-Ramsey Hospital, St. Paul. Program Chairman: Bruce J. Bart, M.D.

Gynecologic Laparoscopy

CARL E. JOHNSON, M.D.* and REGINALD A. SMITH, M.D.*

EVERY PHYSICIAN WHO includes gynecology in his practice has at times wished for an examination of the pelvis that was more accurate than the usual bimanual examination but less traumatic than laparotomy in establishing the presence or absence of pelvic disease when diagnosis was uncertain, yet urgent. In past years this need led to the use of pneumogynecography, hysterosalpingography, posterior colpotomy, and culdoscopy—all valuable aids to the gynecologist and aids that continue to be used regularly in selected cases. However, laparoscopy, or transabdominal peritoneoscopy, has transcended all other methods short of laparotomy for full visualization of the pelvic structures and has offered a method of minor pelvic surgery and tubal sterilization as well. All recent reports have expressed enthusiastic satisfaction with laparoscopy and its use has become widespread. Potential complications and problems secondary to pneumoperitoneum and anesthesia, however, present a risk to the patient, and the procedure should not be considered minor office surgery. Our patients are given a complete preoperative physical examination and laboratory study, which includes roentgenogram of the chest, hematology, urinalysis, blood grouping, and Rh determination.

Visualization of the human peritoneal cavity with a cystoscopelike instrument was first described in 1910 by Jacobaeus¹ in Stockholm. Peritoneoscopy has been used infrequently through the years, but with recent improvements in light source (fiber-optic cold light) and operating technique (controlled pneumoperitoneum with carbon dioxide) and with increasing sophistication of instruments for visualization and intra-abdominal manipulation, gynecologic laparoscopy has been used more widely.

Gynecologic laparoscopy was first started in the

Mayo Clinic in 1971, primarily for diagnostic problems. In 90% of our cases, however, it has since been used for elective tubal sterilization and in only 10% for diagnostic reasons. Many instruments are now available and will not be dealt with here, nor will the technique of establishing pneumoperitoneum and insertion of the laparoscope be described, as detailed information can be found in the medical literature.

Anyone planning to do laparoscopy would be well advised to gain instruction at one of the centers teaching this procedure or to work with a colleague who has received appropriate training. The procedure should be performed in an operating room so that immediate treatment for intra-abdominal bleeding, visceral injury, or abdominal wall hematoma may be undertaken. Accidents that may accompany pneumoperitoneum and anesthesia require the presence of an anesthesiologist.

Obesity contributes to difficulty, particularly in establishing pneumoperitoneum; however, it can occasionally be attained via the posterior vaginal fornix with the patient in deep Trendelenburg position. The presence of previous abdominal surgical incisions presents the possibility of adhesions limiting vision and, also, adherent loops of bowel that may be punctured when the trocar is inserted.

Diagnostic Use

Laparoscopy in clarifying questionable pelvic pathology is particularly valuable in the patient suffering chronic or acute pelvic pain with essentially negative findings on pelvic examination. Chronic pelvic inflammatory disease, or endometriosis, is not infrequently noted in such patients. When no pelvic pathologic condition is noted, this gives support to the probable functional basis of the patient's symptoms that can then be dealt with more realistically.

The differential diagnosis between ectopic pregnancy and corpus luteum of pregnancy can be clearly established; however, laparoscopy is not

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See editorial, page 871.

indicated if the findings on examination are likely to be due to ectopic pregnancy. Laparoscopy should not replace surgical exploration of the abdomen when indicated. It should never be used if intestinal obstruction is suspected or in the presence of acute peritonitis. The patient with acute pelvic inflammatory disease who inadvertently is exposed to laparoscopy should be treated with appropriate antibiotics. A pedunculated fibroid in the adnexal area may obviate exploration or ovarian tumor, particularly in the older patient.

At this clinic it has been the policy not to perform biopsy on smooth cystic or solid ovarian lesions that may harbor malignancy for fear of spreading cellular contents. Biopsy of excrescences or papillary projections on the surface of ovarian tumors for microscopic study can be accomplished easily. The patient with obvious abdominal carcinomatosis need not undergo exploration when the necessary biopsy of a peritoneal lesion is obtained by laparoscopy. If ascites is present, the fluid should be removed prior to pneumoperitoneum. Laparoscopy has been used by some as a "second-look procedure" after operation for malignancy. We have had no such experience.

Laparoscopy has been used in cases of infertility, particularly in patients in whom no abnormality has been detected by other studies. If laparoscopy is performed at the proper time in the menstrual cycle, ovarian evidence of ovulation, tubal patency, and endometrial biopsy can be determined at one time; small tubal adhesions can be cut and punctate areas of endometriosis

cauterized. Developmental anomalies such as uterine duplication, ovarian agenesis, and Stein-Leventhal ovaries are easily visualized, and biopsy of the ovary in patients having amenorrhea is possible. The intrauterine contraceptive device that has perforated the uterus and lies free in the pelvis can be removed by laparoscopy.

Tubal Sterilization

Partial bilateral tubal cautery and excision are easily accomplished. The tube must not be mistaken for round ligament or utero-ovarian ligament. Coagulation cautery is applied first and followed by cutting cautery until there is separation of the tubal ends, 1 to 2 cm from the fundus of the uterus. A small segment of tube is then removed for microscopic identification, although many do not think that removal of a portion of tube is necessary. Coagulation cautery is usually ample to correct bleeding. Postoperative salpingography is not done for fear of forcing open the successfully occluded tube. We have not employed laparoscopy sterilizations less than six weeks postpartum.

Reestablishment of tubal patency is possible in any type of tubal sterilization, and, for this reason, a positive result is not guaranteed. In a study² of 29,496 tubal sterilizations of all types, the failure rate was 0.7%. In other reports² of large series done by laparoscopy, the rate is considerably lower than this figure (0.3%).

Ectopic pregnancy may occur if tubal excision near the cornua is performed after ovulation has occurred and before a possible conceptus can

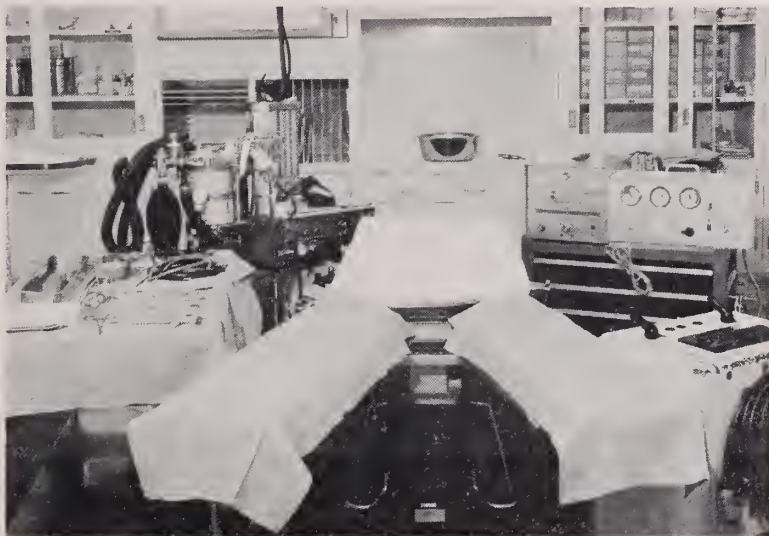


Fig. 1—A split-leg operating table, such as that used for vein-stripping operations, and apparatus used during laparoscopy.

reach the uterus. For this reason, we prefer performing tubal sterilization during or shortly after menses, or on patients taking contraceptives orally and faithfully until the date of operation. The patient who has uterine pathologic conditions, cystocele, or rectocele and requests sterilization is better managed by hysterectomy or vaginal hysterectomy and repair as indicated. Vasectomy is discussed with all couples and is usually recommended instead of laparoscopy-sterilization of the female. The decision rests with the patient and her husband.

Anesthesia

Patients undergoing laparoscopy are admitted

to the hospital the morning of operation and most are given general anesthesia consisting of thiopental (Pentothal) and succinylcholine (Anectine) intravenously and halothane (Fluothane) by inhalation. These patients are intubated and respiration is controlled by the anesthetist. Atropine is usually given before operation but otherwise there is no preparation such as shaving, catheterization, or enema. (Enemas may lead to undesirable gas distention of the colon.) Abdominal and vaginal preparation with soap and Merthiolate is done after anesthetization. These patients are hospitalized for six hours or overnight after the procedure.

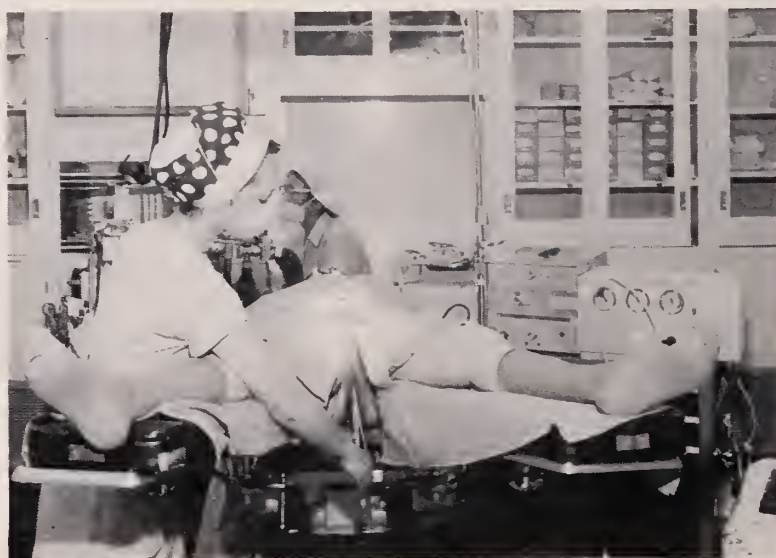


Fig. 2—Uterine cannula and cervical tenaculum in place allowing movement of the uterus from below as illustrated.



Fig. 3—Position of personnel during operation.

A number of patients are given intravenous doses of diazepam (Valium) and alphaprodine (Nisentil) accompanied by abdominal local block. Intubation is not necessary and the patient is released from the recovery room after one or two hours. No problems with acid-base shift have been encountered because the procedure takes only 10 to 12 minutes and the carbon dioxide is then expressed from the abdomen. The trocar sites are closed with subcutaneous catgut unless bleeding requires suture hemostasis.

We have found the operating table used for

vein stripping to be useful for laparoscopy because it avoids the necessity of putting the patient's legs in stirrups (Figure 1, 2, and 3). The legs can be separated so that manipulation of the cervical tenaculum with the intrauterine probe is easily accomplished for uterine mobility when necessary. Dilatation and curettage also can be done with the patient in this position. Laparoscopy will continue to be an important diagnostic procedure. A simpler method of sterilization is desirable.

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He loved to have the cloth laid, because it had been the fashion of his youth, but his conviction of suppers being very unwholesome made him rather sorry to see anything put on it; and while his hospitality would have welcomed his visitors to everything, his care for their health made him grieve that they would eat.

Such another small basin of thin gruel as his own was all that he could with thorough self-approbation, recommend; though he might constrain himself, while the ladies were comfortably clearing the nicer things, to say—

“Mrs. Bates, let me propose your venturing on one of these eggs. An egg boiled very soft is not unwholesome. Serle understands boiling an egg better than anybody. I would not recommend an egg boiled by anybody else—but you need not be afraid, they are very small, you see—one of our small eggs will not hurt you. Miss Bates, let Emma help you to a *little* bit of tart—a *very* little bit. Ours are all apple-tarts. You need not be afraid of unwholesome preserves here. I do not advise the custard. Mrs. Goddard, what say you to *half* a glass of wine? A *small* half-glass, put into a tumble of water?”*

*Jane Austen: Emma, Chapter 3. 1816.

Esophageal Findings in 755 Fiberoptic Upper Gastrointestinal Endoscopies

GERALD R. ONSTAD, M.D.*

THE PURPOSE of this paper is to define the relationship between patients' symptoms and the frequency and type of esophageal lesions. The records of all patients at Hennepin County General Hospital who underwent gastrointestinal endoscopy during the three-year period, 1970 through 1972, were reviewed.

Fiberoptic technology has developed to the stage where esophagus, stomach and duodenum can be easily examined. The trained physician will routinely visualize all three areas during endoscopy. Even though the data to be presented refer almost exclusively to the esophagus, it represents experience with both esophagogastroscope and esophagogastroduodenoscopy. Esophagoscopy as an isolated examination was rarely performed.

Results

During the three-year period, 1970 through 1972, 755 upper gastrointestinal endoscopies, using a forward viewing instrument, were performed. The average patient was 50 years with a range from 17 to 94. Males outnumbered females two to one. Other than mild sore throat, no complications were associated with these procedures. Approximately 2% of attempted endoscopies (16 patients) were unsuccessful.

Table 1 lists the indications for upper gastrointestinal endoscopy, the total number of procedures performed for each indication, and the frequency of abnormal esophageal findings. "Pain" in this table refers to non-specific upper abdominal distress and was almost always associated with negative upper gastrointestinal studies. "Xrays" refers to findings of barium studies which needed clarification and/or biopsy. To avoid duplication, "Followup" endoscopies are

not included in the remaining data. Almost all patients without esophageal lesions had endoscopic abnormalities in the stomach or duodenum.

Upper gastrointestinal bleeding, manifested by either hematemesis and/or melena, could be related to an esophageal lesion 30% of the time. Table 2 separates this bleeding group into alcoholic and non-alcoholic populations. If bleeding from esophageal varices is excluded, then similar numbers of patients from each group are bleeding from esophagitis and Mallory-Weiss tears. For the other indications listed in Table 1, the alcoholic population comprised about 20% of each total, and the frequency of different types of abnormal endoscopic findings was not disproportionate.

TABLE 1
Frequency of Esophageal Lesions Related to Indications for Endoscopy

Indication	Total Endoscoped	Esophageal Lesions Number	% of Total
Bleeding	333	99	30
Pain	111	16	14
X-Ray finding	105	7	7
Followup	72	20	28
Anemia	47	10	21
Dysphagia	29	24	83
Nausea, vomiting	20	6	30
Heartburn	17	12	70
Other*	21	12	57
Total:	755	206	27%

*Indications included ingestions, foreign bodies, gunshot wound, varices.

TABLE 2
Etiology of Esophageal Bleeding in Alcoholic and Non-Alcoholic Populations

Cause	Number of Alcohols	Number of Non-Alcohols	Total
Esophagitis	18	21	39
Varices	40	2	42
Mallory-Weiss Tear	11	7	18
Total	69	30	99
Number in Population	155	178	333
% with Esophageal Lesion	44	17	30

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From the Department of Medicine, Hennepin County General Hospital, Minneapolis, Minnesota, and the University of Minnesota Medical School.

Eighty-seven percent (288/333) of the bleeding group had radiographic barium studies of the upper gut. As might be anticipated, these X-ray studies did not demonstrate either esophagitis or a Mallory-Weiss tear. Varices were seen radiographically in 18, less than half of the 42 directly visualized through the endoscope. In this variceal group, an additional benefit of the barium study was the demonstration of lesions distal to the esophagus in 10%.

Endoscopy for indications other than bleeding showed esophageal lesions in about 25% (87/350). Esophagitis accounted for the majority of these lesions, about 80% (70/87). In decreasing order of frequency, esophageal cancer, esophageal rings, esophageal diverticula, and achalasia make up the remaining positive findings. Except for esophagitis, the barium studies in these patients accurately defined all lesions.

The radiographic diagnosis of hiatus hernia and its relationship to the endoscopic diagnosis of esophagitis is shown in Table 3. Overall, hiatus hernia was seen in about 10% of all barium studies done (71/638). Of all patients with endoscopic esophagitis, about 40% had coexistent roentgenographic hiatus hernia and conversely, about 60% of the patients with esophagitis had no hiatus hernia. Of those with hiatus hernia, about 65% had concomitant esophagitis.

TABLE 3
Relationship of Radiographic Hiatus Hernia
and Endoscopic Esophagitis

Radiographic Hiatus Hernia	Endo- scopic Present	Esopha- gitis Absent	% Esophagitis
Present (71)	46	25	65%
Absent (567)	63	504	11%
% Hiatus Hernia	42%	5%	

Biopsy through the endoscope was positive in seven cases of esophageal cancer and negative in one. Multiple pieces of tissue were obtained in all these cases and, on the average, one in six yielded tumor. One grossly benign-appearing stricture showed histologic cancer on biopsy. Histologic esophagitis was sometimes demonstrated in biopsies from grossly normal esophageal mucosa.

Discussion

Hennepin County General Hospital serves both the medically indigent and emergent patients of Hennepin County. On the average, more alcoholics and alcoholics with more advanced liver

disease are seen here than in a private hospital of similar size. If this alcoholic population is excluded from the above data, a significant number of the remaining patients (20-25%) had esophageal lesions associated with their symptoms that led to endoscopy. This non-alcoholic population should be similar to the group seen in other acute care hospitals.

In this hospital, the patient with upper gastrointestinal bleeding is endoscoped as soon as possible after admission and barium studies usually obtained within 48 hours. For the other categories listed in Table 1, barium studies almost always precede endoscopy. These X-ray studies help the clinician decide whether or not endoscopy might be helpful, and also, frequently indicate the area of abnormality. For both the radiologist and the endoscopist, knowing where to look should increase the useful information obtained from either procedure.

In previous years, a variety of complaints have been attributed to the presence of a hiatus hernia. Recent studies relating the function of the gastroesophageal sphincter, hernia, and esophagitis¹, and endoscopic studies relating hernia and esophagitis² indicate that symptoms are not due to the hiatus hernia per se. In this series, 65% of patients with hiatus hernia had coexistent esophagitis. This incidence is probably abnormally high since asymptomatic patients with hiatus hernias are usually not endoscoped. Over half the patients with esophagitis do not have a hiatus hernia.

At present, biopsies obtained through the fiberoptic endoscope are tiny. Specimens rarely show more than mucosa. Multiple biopsies must be obtained from suspicious lesions and are helpful only if positive. Negative biopsy does not exclude disease. If a deeper biopsy specimen is desired, some other method must be used. Cytologic examination of material obtained by washing, brushing, or scraping the esophageal mucosa is useful in some centers³ but is not done at this hospital.

In this series, no complications occurred as a result of endoscopy. However, perforation of the gut, bleeding, cardiac arrhythmias, and adverse reactions to drugs, as well as other undesirable events, have been reported.^{4,5,6} The procedure involves some risk and should be done only when clearly indicated. A trained endoscopist working with an informed, cooperative patient will minimize the generally accepted morbidity and mortality rate of 0.1 to 0.3%.^{4,5,6}

Summary

The relationship between symptoms and frequency and type of esophageal lesions found during upper gastrointestinal endoscopy in 755 patients is described. If esophageal varices are

excluded, the frequency of abnormal endoscopic findings is similar for alcoholic and non-alcoholic populations. As might be expected, esophagitis, with or without radiographic hiatus hernia, was the most frequent abnormality noted.

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Cover Photo

"Dawn Over Decoys"

Dr. Rodger R. Lundblad took the cover photo "Dawn Over Decoys" at Heron Lake, Minn. early in the duck hunting season of 1972. The occasion was a fathers and sons hunting weekend at the Benson Hunt Club.

The picture was taken with a Nikkormat FTN 50 mm lens and Kodachrome II film.

Doctor Lundblad is a urologist on the staff of Hennepin County General Hospital and a clinical instructor in the Department of Urology at the University of Minnesota, as well as being in private practice in Minneapolis.

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Applications of Endoscopy to the Visualization of Biliary and Pancreatic Ducts

J. A. VENNES, M.D.*

FIBEROPTIC ENDOSCOPY is becoming generally available as a safe, precise technique in evaluation of the upper gastrointestinal tract. Extension of endoscopy to include the difficult evaluation of possible biliary and pancreatic disease is an important recent advance. Initially developed in Japan,¹⁻³ experience and refinements of technique are now reported from other centers.⁴⁻⁶ General availability for endoscopists is anticipated within several years. This report describes the procedure and results of 192 studies. Representative clinical application is shown.

Methods

Patients were selected because a diagnostic problem was incompletely resolved after clinical evaluation with conventional measures. Clinical diagnoses are summarized in Tables 1 and 2.

The fasting patient is prepared with Diazepam (Valium) 2-30 mgm. for sedation. Dicyclomine HCl (Bentyl) 60 mgm. and Atropine Sulfate 0.6 mgm. are given intramuscularly initially to effect duodenal atony and ampullary smooth muscle relaxation. Alternatively, smaller amounts of anticholinergic drugs may be supplemented by intravenous Glucagon 0.5-1.0 mgm. at periodic intervals during the procedure.

TABLE 1
Clinical Problems studied by Endoscopic
Pancreatography

Pancreatic Carcinoma	18
Pseudocyst	12
Acute Pancreatitis	19
Chronic Pancreatitis	14
Possible Retrogastric Mass	6
Duct Not Visualized	19
Total	88

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The procedure is carried out in a radiology examining room equipped with padded table and fluoroscopic monitor which provides an image of good resolution. A side-viewing flexible duodenoscope is gently passed through the stomach and duodenal bulb into the descending duodenum. After an expeditious search of the descending and proximal third portion of the duodenum, the papilla is identified and cannulated (Figures 1-2).

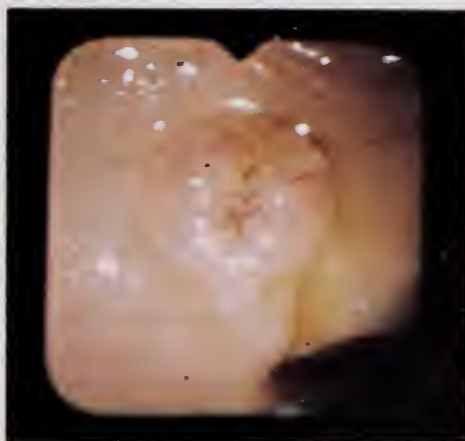


Fig. 1—Normal papilla of Vater seen on posterior medial wall of descending duodenum. One of many varied shapes and appearances.

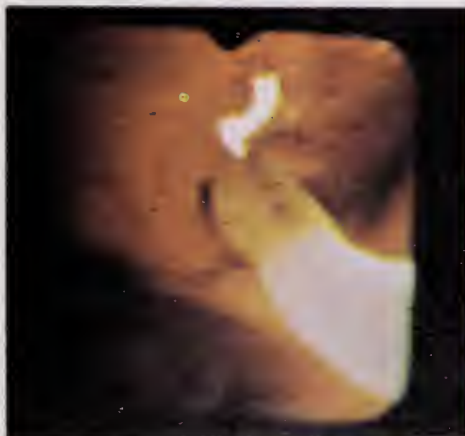


Fig. 2—Normal papilla with cannula in place. Common bile duct next visualized by injection of dye.

TABLE 2
Clinical Problems Studied by Endoscopic
Cholangiography

Diagnosis	
A. Extrahepatic Obstruction	62
Cholelithiasis	
Tumor	
Cholangiocarcinoma of bile duct	
Pancreas	
Metastatic, nodes	
Benign Stricture	
Duct not Visualized	8
B. Primary Liver Disease and	
Possible CBD Obstruction	31
Alcoholic Liver Disease	
Chronic Active Hepatitis	
Sclerosing Cholangitis	
Biliary Cirrhosis	
Drug-induced Cholestasis	
Congenital Hepatic Fibrosis	
Duct not Visualized	7
Total	108

Sixty percent Diatrizoate (Renografin) is cautiously injected under close fluoroscopic control. If only the pancreatic duct is being opacified, 2-5 ml of dye are injected slowly to avoid ductal over-distension. If the common bile duct is entered 5-40 ml of contrast agent will be needed to fill all structures; the larger amounts are required if the gallbladder fills during the procedure. In visualizing the gallbladder or a dilated common bile duct the use of 20% Renografin is frequently advisable so that small filling defects are not overlooked. If the desired duct is not initially entered, the cannula is repositioned, and contrast agent again introduced into the other ductal system. The technical details of this maneuver have been largely mastered. Finally, spot films are quickly obtained as good ductal detail is defined fluoroscopically.

Results

Of 230 cannulation attempts, 196 were successful. More importantly, the clinically desired duct was visualized in diagnostic detail in 174 (75%). In our most recent experience, 91 of the last 100 cannulation attempts have visualized the clinically desired duct.

Experience in the study of patients with suspected pancreatic disease is summarized in Table 1. Detailed results in this group are being reported separately.⁷ The primary diagnosis of pancreatic carcinoma was erroneously interpreted as chronic pancreatitis in three patients, since the two diseases co-existed. Ductal disruption was part of the necrotizing process of pseudocyst for-

mation in all 10 alcoholic patients studied so that the cyst filled readily as the duct began filling. In two more non-alcoholic patients pseudocyst formation was evidenced by ductal obstruction. Ductal visualization four weeks after episodes of acute pancreatitis has not been greatly rewarding. Two unsuspected pseudocysts were visualized as two instances of calculi in the gallbladder and common duct were discovered. In a third patient an extremely large spastic papilla prevented duct



Fig. 3—Normal cholangiogram. Patient with recurrent acute pancreatitis was studied to rule out associated biliary tract disease. Pancreatic duct was outlined later in the study.



Fig. 4—Normal pancreatogram. Note distal end of fiberoptic endoscope in air-filled descending duodenum. Instrument diameter is 10 mm. Duct pursues a normal tapering course with many fine secondary lateral branches filled.

visualization and this patient has been treated with sphincteroplasty at another hospital. Though we have not recognized papillitis as a cause of pancreatitis, the longer term results in this patient are awaited with interest. The group of patients with chronic pancreatitis are being systematically studied to determine whether ductal characteristics

offer any pathogenetic clues. Ductal characteristics may also be helpful in planning the surgical approach occasionally needed in management. Tortuous dilatation, with or without obstruction and dilated snubbed off lateral branches are the most frequent findings in chronic pancreatitis. In six patients a normal retroperitoneal space was correctly interpreted from findings of normal pancreatic duct position. This aided in the evaluation of radiologically suspected retrogastric mass lesions.

The 108 patients studied because of suspected biliary tract disease are divided in two categories (Table 2). Thirty-eight studies were attempted because extrahepatic obstruction was of clinical concern in patients with presumptive primary liver disease as the cause of jaundice. Surgical cholangiography was obviated in this group of patients. Although only a few proved to have extrahepatic obstruction many had abnormalities of the intrahepatic biliary tree. The remaining 70 patients with a clinical diagnosis of extrahepatic obstruction were studied to determine the site and etiology of obstruction preoperatively. Surgical management was thus facilitated and shortened.

Endoscopic cholangiography proves to be highly specific in determining the existence, site and etiology of extrahepatic obstruction.⁸ Studies listed as failures in either the pancreatic or biliary system include those in which the clinically desired duct was not visualized either because of failure to cannulate the papilla or because only the other ductal system was visualized. In three patients an endoscopic diagnosis of malignancy in the ampullary area was made although cannulation was impossible. In four more patients complete ductal obstruction was found at surgical exploration. Most failures occurred in the developmental phases of the procedure.

Endoscopic cannulation is generally very easily tolerated by the patient. Seven patients developed pancreatitis as evidenced by abdominal pain of over two hours duration and elevated amylase levels; none had fever or leukocytosis. When urine amylase levels were determined within 24 hours after the procedure in a randomly selected group of 70 patients who experienced no post-procedural discomfort, we found hyperamylasuria in more than one third.⁹ This is similar to the experience of others.⁴ Febrile reactions developed 24 hours after the procedure in eight patients.



Fig. 5—Many gallstones in common duct and gallbladder. 65-year-old man with two weeks' history of vague RUQ pain. Serum bilirubin fell from nine to four mgm percent; alkaline phosphatase four x normal. No previous history of biliary tract disease. Pancreatic ducts were beginning to empty but normal when outlined earlier in study. Surgery expedited by study; initial surgical cholangiogram obviated.



Fig. 6—Pancreatic pseudocyst. 48-year-old alcoholic male presenting with persisting pain, fever, hyperamylasuria. Pancreatic calcification on abdominal X-ray. Note ductal filling in head of pancreas with (immediate) extravasation of dye into cyst-like space. Pseudocyst demonstrated, no attempt made to define its size. At surgery a layer cyst cavity was successfully drained through a cystgastrostomy.

Two of these occurred after dye entered a pancreatic pseudocyst and in the other six after visualizing an obstructed common bile duct. Three of the latter group had clinical evidence of cholangitis. These serious reactions have been avoided since adopting a policy of early surgery. When obstruction of either ductal system is clinically suspected the problem is reviewed with surgical colleagues and the patient is tentatively scheduled for surgical management the day following en-

doscopic study. In our opinion, this policy should be rather rigidly adhered to.

Conclusion

Fiberoptic endoscopy has been successfully adopted to the study of the pancreatic and biliary ducts. Visualization of the clinically desired system may be expected with acceptably high frequency, producing studies of diagnostic quality. Low morbidity can now be expected. The procedure can be learned by trained endoscopists with sufficient ease so that it is expected to become generally available.

Our development of this new procedure is due in large measure to the patient assistance and judgment of Marsha Dreyer and Helen Donahue. Their special dedication is gratefully acknowledged.

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Meetings

October 21—Minnesota Society of Internal Medicine, Semiannual Meeting, 8 a.m.
Program Chairman: David Dines, M.D. Mayo Clinic, Rochester, Minn. 55901.
Mann Hall, Medical Science Bldg., Rochester.

October 29-31 and November 5-7—Clinical Reviews, Mayo Clinic & Mayo Foundation, Identical Sessions. \$50 registration fee. Write Postgraduate Courses, Mayo Clinic-Mayo Foundation, Rochester, Minn. 55901.

November 9—Minnesota Dermatological Society, Quarterly Clinical Meeting, St. Paul-Ramsey Hospital, Program Chairman: Bruce Bart, M.D.

Sixth Annual North Memorial OB-Gyn Symposium

On Friday, November 30, 1973, in Minneapolis, Minnesota, the Sixth Annual North Memorial Hospital OB-Gyn Symposium will be held. Selected speakers will discuss current topics of interest in the field. The Symposium will be followed the next day by the annual meeting of the Minnesota State Obstetrics and Gynecological Society. Inquiries should be directed to Alec Janes, M.D., Program Chairman, 601 Oakdale Medical Center, Mpls (55422).

Removal of Gastric Polyps by Fiberoptic Gastroscope

PAUL B. DICKINSON, M.D.* and ALPHONSO A. BELSITO, M.D.*

SNARE-CAUTERY DEVICES have recently been designed for use through fiberoptic colonoscopes. Volf and Shinya have demonstrated that colon polyps can be removed safely and reliably by this method.¹ The following report describes successful removal of gastric polyps by using a similar snare-cautery device through the fiberoptic gastroscope.

Materials and Technique

The Olympus model GIF panendoscope was used to perform the polypectomies. It is of end-viewing design and has a working length of 100 cm. The snare-cautery device has a self-forming loop and can be operated with one hand (Figure 1).[†]

The procedure is performed in an endoscopic examining room in the outpatient department. Premedication with IM Meperidine and Atropine is administered 30 minutes prior to procedure. Diazepam is administered intravenously immediately prior to intubation. The esophagus, stomach, and duodenum are examined closely for presence and severity of atrophic mucosal changes. If possible, the patient is positioned so that the polyp is suspended into the gastric lumen (Figure 2).

We use the same technique for snaring and amputation of gastric polyps that we use for removal of colon polyps. A loop is formed, passed over the polyp and maneuvered near the base of the stalk (Figure 3). With the polyp under direct vision, current is applied to the snare and with

slow steady pressure the polyp is severed. The sheath with snare wire is immediately removed and suction is applied to impact the severed polyp in the tip of the gastroscope. The polyp can almost always be retrieved if constant suction is maintained while the gastroscope is removed. If this maneuver is unsuccessful the polyp can be grasped by the biopsy forceps and the gastroscope removed with forceps in place. The patient is then re-intubated and the stalk remnant closely examined. Any bleeding points present are fulgurated by electrocautery (Figure 4). After observation in the endoscopy area for two hours the patient is

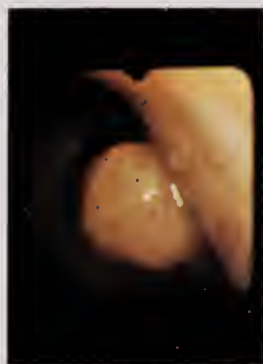


Fig. 2—Antral polyp. A portion of the stalk is visible.

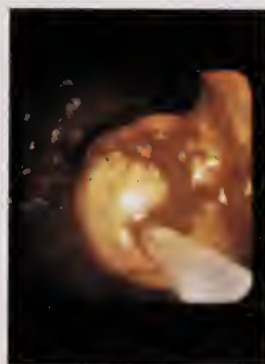


Fig. 3—The same polyp as in Figure 2 with snare wire in position for removal of polyp.



Fig. 4—Appearance of polyp base after polypectomy and fulguration of bleeding sites.



Fig. 1—The snare-cautery device. The plastic sheath and snare wire are flexible and pass through the biopsy channel of the gastroscope.

*St. Paul, Minnesota.

†Snare and cautery manufactured by Cameron-Miller Surgical Instruments Company, Chicago, Illinois.

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discharged home or to the ward. A soft diet is prescribed for seven days and the patients instructed to seek medical attention at once if hematemesis or melena occurs.

Clinical Experience

Fourteen pedunculated polyps were removed from 11 patients. Clinical data and endoscopic findings and diagnosis are presented in the Table. There was a high incidence (nine out of 11) of atrophic gastric mucosa. The two polyps which had malignant changes were both less than 2.0 cm. in diameter. The polyps with long stalks were technically more difficult to snare because they were more mobile. The procedure was well tolerated and post-polypectomy bleeding or perforation was not encountered.

Discussion

Approximately 50% of patients with gastric polyps are completely asymptomatic.² The most common presenting complaint is abdominal pain which in most cases is caused by an associated gastritis. Iron deficiency anemia is a common

finding. This anemia may be caused by repeated small hemorrhages from the polyps but in many cases is the result of impaired iron absorption because of the accompanying hypo and achlorhydria. As a general rule, the larger the polyp the more likely it will ulcerate and bleed but on occasion even a small adenoma may bleed profusely. Symptoms of intermittent outlet obstruction may accompany an antral adenoma with a long stalk that prolapses into the pyloric canal.

Gastric polyps are considerably less frequent than colon polyps. Marshak and Feldman found an incidence of 0.28% in 50,000 upper gastrointestinal barium studies and a mean incidence of 0.43% after review of 74,823 autopsies.² The incidence is much higher in selected populations such as individuals with hypochlorhydria (1.1%), achlorhydria (3.4%), and Addisonian pernicious anemia (6.5%).³

After gastric polyps are detected close surveillance is required because of their association with carcinoma of the stomach. Up to the present time the working approach towards gastric polyps has been to remove those greater than 2 cm. in diameter.

TABLE
Findings in Nine Patients with Gastric Polyps.

Age	Presenting complaint	Endoscopic findings	Diagnosis
62	Epigastric pain	15mm polyp on 10mm stalk in mid antrum	adenomatous polyp
73	none	8mm polyp on 10mm stalk in distal antrum, atrophy	adenomatous polyp
74	anemia	10mm polyp on 20mm stalk in mid antrum, gastric atrophy	adenomatous polyp
65	anemia	15 & 18mm polyp on long stalk in antrum gastric atrophy	2 adenomatous polyps
76	anemia	10mm polyp on 15mm stalk and 15mm polyp on 20mm stalk severe gastric atrophy	carcinoma in tip of both polyps
62	none	15mm polyp on 15mm stalk, gastric atrophy	adenomatous polyp
59	none	20mm polyp on 15mm stalk. Severe atrophic mucosa	adenomatous polyp
30	epigastric pain	Peutz-Jagher syndrome numerous small polyps. Two largest were 20 and 22mm	adenomatous polyp (x2)
72	none	18mm polyp in low body on 15mm stalk. Severe gastric atrophy	adenomatous polyp
66	anemia	15mm polyp in antrum on 10mm stalk, gastric atrophy	adenomatous polyp
73	epigastric pain	20mm polyp in low body, 10mm stalk, severe gastric atrophy	adenomatous polyp

ter because the risk of malignancy is considerable in a polyp of that size.⁴ The possibility of carcinoma occurring in an adenoma less than 2 cm. in diameter was recognized but the incidence was believed to be so low as to not justify the risk associated with surgical removal. That size alone is not an infallible criterion for absence of malignancy as emphasized by reports of carcinoma in small gastric polyps by Bowden,⁵ Rosato and Noto,⁶ Hay,⁴ and from the present series. A difference of opinion exists, regardless of polyp size, as to their malignant potential.^{7,8} Recently, Tomasulo has described criteria for subdivision of polyps into two histologic types, hyperplastic and adenomatous.⁹ The hyperplastic type of polyp was more numerous, was randomly distributed in the stomach, and was infrequently associated with gastric carcinoma. The adenomatous type of polyp was antral in location and associated frequently with achlorhydria, malignant transformation and infiltrative carcinoma. The two types of polyps had the same roentgenographic characteristics.

Endoscopic gastric polypectomy appears to be a low risk procedure without significant complication.¹⁰ It is well tolerated by elderly patients, many of whom have coexistent medical problems which place them at high risk for surgical polypectomy.

The ability to remove gastric polyps with the gastroscope will improve the management of patients with these gastric tumors. A precise diagnosis can be made with the entire polyp available for histologic examination. If adenomatous epithelium or carcinoma in situ is identified the patient should have segmental resection of a rim of uninvolved mucosa. Partial gastrectomy may be the treatment of choice if multiple polyps are present. Patients who have adenomatous polyps of the type associated with gastric carcinoma should have roentgenographic or endoscopic evaluation every 6 months. Management of gastric polyps in this fashion will lead to earlier detection of gastric carcinoma and increase the survival rate of patients with this type of neoplasm.

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Fade far away, dissolve, and quite forget
What thou among the leaves hast never known,
The weariness, the fever, and the fret
Here, where men sit and hear each other groan;
Where palsy shakes a few, sad, last grey hairs,
Where youth grows pale, and spectre-thin, and dies*

*Keats' "Ode to a Nightingale."

Polypectomy Using the Fiberoptic Colonoscope

CECIL H. CHALLY, M.D.* and WILLIAM D. BLACKWOOD, M.D.†

WITH THE ADVENT of colonoscopy, neoplasms beyond the reach of the sigmoidoscope can be directly evaluated. Now benign and malignant polyps can be observed, biopsied, and removed without laparotomy and colotomy with its inherent mortality of 0.4 to 2 percent^{1,2,4,5} and morbidity as high as 20 percent.¹⁻⁵

Sigmoidoscopic treatment of polyps is well established¹ and now colonoscopy allows adaption of this approach to removal of polyps from the rest of the colon. As a result of the pioneering work of Wolff and Shinya^{6,7} colonoscopic removal of polyps has become practical for the experienced endoscopist. In the recently published report of their experience with 303 polypectomies, the most encouraging aspect of their work was the low morbidity and lack of mortality. These data are supported by Ottenjann's work.⁸

This paper summarizes the Minneapolis V.A. Hospital experience over the past 10 months during which 58 polyps greater than 0.5 cm were removed with the colonoscope.

Methods

Patients were admitted to the hospital on the day prior to the procedure. A complete history and physical examination was done. Routine lab studies included a complete blood count, a platelet count, a prothrombin time, a chest Xray and an electrocardiogram.

Preparation for the procedure consisted of a three-day liquid diet, kanamycin 500 mg p.o. q.i.d. for two days, and bisacodyl NF 10 mg. p.o. or castor oil two ounces 24 hours prior to the

procedure. On the morning of the examination the patient received tap-water enemas until clear. Inadequate bowel cleansing on this regimen was unusual.

Just prior to the procedure, diazepam was given slowly intravenously to a state of mild sedation and 60 mg. dicyclomine HCL was given intramuscularly to decrease bowel motility. The dose of diazepam necessary for mild sedation varied from 1 to 20 mg. and must be given carefully in patients over 60 and in those with diminished pulmonary reserve. On this regimen the patient tolerated the procedure with only mild discomfort. Passage of the well-lubricated colonoscope was accomplished in the left lateral recumbent



Fig. 1—Cameron-Miller snare (new model).



Fig. 2—Cameron-Miller snare.

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position and the entire colon was examined using this or the supine position. After the polyp was located and biopsied, it was positioned properly in the bowel lumen. Then either of the wire snares (Figures 1 and 2) was placed over the polyp and the loop tightened around its base. The proximal end of the snare was attached to the electrosurgical unit[†] and the stalk or base of the polyp was transected with a coagulating current which provides hemostasis. Following excision we examined the site for bleeding. The resected polyp was retrieved by aspirating it into the tip of the colonoscope or by grasping it with the snare



Fig. 3—X-ray picture of representative polyp.

and then withdrawing the entire colonoscope. This sequence of events is depicted in Figures 3, 4, 5, 6 and 7.

*Olympus CF-LB—Olympus Corporation of America, 2 Nevada Drive, New Hyde Park, New York, N.Y. 11040.

†Bovie Electrosurgical Unit Model 0-4—Liebel-Flarsheim Company, Division of Sybron Corporation, Cincinnati, Ohio 45212.

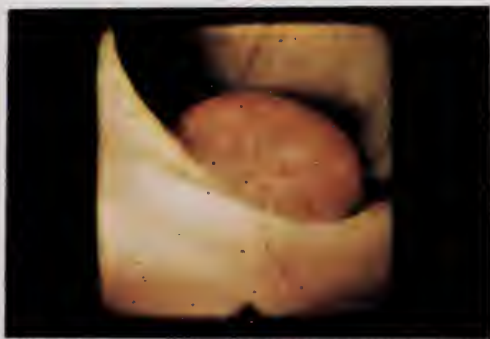


Fig. 4—Same polyp as seen via the colonoscope.



Fig. 5—Snare in place around the polyp pedicle.

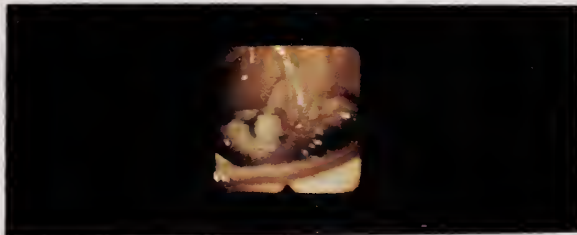


Fig. 6—Polyp base after resection of the polyp with its stalk.

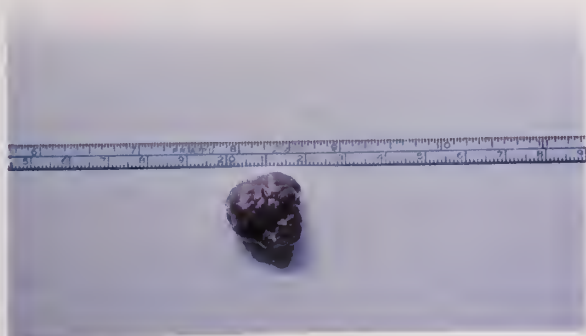


Fig. 7—Retrieved polyp of approximately 2.0 centimeters diameter.

The patient was observed for a change in his vital signs and colonic bleeding. If no complications occurred the patient was discharged the following day with instructions to notify us immediately if rectal bleeding occurred. One month later a barium enema was performed in an attempt to document removal of the polyp. If the polyp was sessile and at the time of resection not completely removed, colonoscopy was repeated six weeks later. Long-term follow-up includes a yearly proctosigmoidoscopy and barium enema.

Results

Fifty-eight polyps were removed from forty-seven patients. Three patients had two examinations in order to remove multiple polyps. The size of the polyps varied from 0.5 to 4.0 cm as shown in Table 1. Polyps under 5 mm in diameter were excluded from this study since they are very rarely malignant^{1,8,9} and are readily treated by biopsy and coagulation.

The distribution of the fifty-eight polyps is shown in Table 2. Seventy-three percent were located in the rectum and sigmoid colon. Localization of polyps in reference to anatomic divisions is more satisfactory than by distance from the anal verge since the sigmoid loop stretches or telescopes during the procedure.

While pedunculated polyps were readily re-

moved, sessile polyps often were difficult to snare especially if they were located between haustra. All the polyps were removed in toto and not piecemeal. Polyps which appeared malignant were biopsied and no attempt was made to remove them. The majority of the polyps removed were benign adenomas as is shown in Table 3. Distinction was made between "superficial" and "invasive" carcinomatous changes because of previous literature findings.^{3,9-14} Superficial carcinomas may be adequately treated by local excision, whereas

TABLE 3
Pathological Status of Specimens

Status	No. of Cases
Adenomatous polyps	45
with superficial or focal carcinoma	1
Villous or papillary adenoma	3
with atypia or Ca in situ	2
with superficial carcinoma	1
Mucosal polyps	4
Miscellaneous (lipoma)	1
Unretrieved	3
Malignant polyps	2
Polypoid adenocarcinoma	1
Villous adenoma with invasive Ca	1
Total	58

invasive carcinoma should be treated by surgical resection.

Usually polyps could be removed at the first attempt, but occasionally, because of length of the procedure or technical difficulties, a second attempt was needed.

Complications

There were three immediate complications which occurred in the first twenty-five cases. Brisk bleeding occurred following the resection of one 2.0 by 4.0 cm sessile polyp and one 3.0 cm polyp with a 1.0 cm stalk. Total blood loss in each case was approximately 100 ml. The most serious complication was a bowel perforation which resulted in an emergency laparotomy with colostomy and later reanastomosis. An experimental snare (Frankenfeld) used for this procedure had a sharp, rigid tip especially when extended from the tubing a short way. Since that time three different snares* with tips, which are blunt and flexible, have been used without difficulty.

Discussion

With the advent of colonoscopy a procedure is now available which complements radiologic detection of colonic disease. In previous studies when the colon was examined using a sigmoidoscope inserted through multiple colotomy sites, 14

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TABLE 1
Size of Polyps Removed at Polypectomy

Size (cm)	No. of Polyps
0.5-0.9	19
1.0-1.9	30
2.0-2.9	5
3.0-3.9	3
4.0-4.9	1
Total	58

TABLE 2
Anatomic Location of Polyps Removed

Location	No. of Cases
Rectum	2
Distal sigmoid	19
Middle & proximal sigmoid	21
Descending colon	7
Splenic flexure	2
Left transverse colon	0
Right transverse colon	1
Hepatic flexure	2
Ascending colon	3
Cecum	1
Total	58

to 46 percent of the patients had polyps not shown by prior x-ray examination.^{2,5,9} In two studies 15 to 30 percent of these polyps were greater than 1.0 cm.^{2,9} Furthermore, grossly invasive carcinomas undetected by barium x-ray studies were also found using this technique.* Based on these findings, we therefore feel that the entire colon must be examined by colonoscopy prior to polypectomy.

Removal of polyps using the colonoscope appears to provide an acceptable alternative for laparotomy and colotomy. Colonoscopy is tolerated well by the patients, thus it is not difficult to obtain consent for a second or third procedure. The studies of Wolff and Shinya⁶ as well as the present one show that polyps can be removed via the colonoscope with no mortality and low morbidity. However, polyp removal can result in complications which require immediate surgical intervention. Thus sound medical and surgical evaluation prior to the procedure is necessary and adequate surgical backup must be readily available. Because of the remote possibility of emergency surgery, patients are given a standard surgical bowel preparation before polypectomy.

In our estimation, a physician who has experience in upper gastro-intestinal endoscopy, can acquire a high degree of proficiency in colonoscopy by performing about 50 examinations. The polypectomy technique can be mastered with moderate additional training time.

Excisional biopsy of the polyp allows complete histologic examination of the entire lesion which is impossible with simple biopsy through the

colonoscope. Therefore, when in situ, superficial, or invasive cancer is encountered, it can be dealt with correctly. As outlined in Welch's monograph,¹ in situ and superficial carcinomas can be treated effectively by polypectomy. If invasion of the muscularis mucosa has occurred a subsequent standard cancer procedure is done.^{3,9,10}

At the present time follow-up examinations include a yearly barium enema and proctosigmoidoscopy. Support for this type of follow-up is provided by the reports of Rider et al.¹⁵ and Deddish and Hertz.² Rider found that in 537 patients followed for four to nine years after polyp removal 40 percent developed additional benign polyps and 3.2 percent developed carcinomatous polyps or invasive cancer of the colon.

Since the average hospital stay for colonoscopic polypectomy is one to two days versus seven to ten days following laparotomy and colotomy, the cost of hospitalization will greatly decrease using this approach.¹⁶ The ability of the patient to return to work in a few days in contrast to several weeks delay after laparotomy also further eases his financial burden.

Whether removal of all polyps prevents later development of colonic carcinomas is still a matter of much debate.^{13,14,17} Polyps measuring 1.0 to 2.0 cm on barium enema have a 10 percent chance of being malignant, and above this size the incidence of cancer increases.^{1,8,9} The malignant polyps which we resected ranged from 1.0 to 4.0 cm in size. If the present mortality and morbidity figures continue to be representative of polyp removal, colonoscopy polypectomy should provide an attractive alternative to laparotomy.

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Gastric Malignancy

Gastroscopic Experience

ALPHONSO A. BELSITO, M.D.* and PAUL B. DICKINSON, M.D.*

CARCINOMA OF THE STOMACH appears to be declining in incidence in the United States as opposed to other parts of the world. Nevertheless, it continues to be a significant cause of cancer deaths and poses difficulties in differentiation from benign gastric ulcer.

Malignant gastric lesions have been discovered in 58 patients out of more than 600 gastric ulcers examined in the past five years by esophagogastroduodenoscopy. The roles of fiberoptic endoscopy and upper-gastrointestinal roentgenogram were reviewed regarding the prompt and accurate evaluation of the patient with an intragastric lesion or ulcer. The influence of early diagnosis on subsequent treatment was also examined.

Method

The patients were examined in eight community hospitals. The endoscopic examination in nearly all instances followed the upper-gastrointestinal roentgenogram and was performed at the same hospital within one week.

The technique and premedication have been previously described.¹ Several different instruments were used for the examinations as the development of new, flexible, fiberoptic instruments has been rapid since 1967. Currently, we use the GIF[†] flexible fiberoptic esophagogastroduodenoscope as our routine instrument for examination of the upper-gastrointestinal tract. This is an end-viewing 100 cm. endoscope and has full biopsy, aspiration, washing and photographic capabilities from the esophagus into the second portion of the duodenum. Some of our examinations were performed using the JF-B side-viewing 120 cm. duodenoscope, although its primary use has been for cannulation of the Papilla of Vater with subsequent retrograde cholangiopancreatography.

Patients with a diagnosis of carcinoma of the stomach or malignant lymphoma have been reviewed. All appropriate roentgenographic reports were studied. A mention of malignancy, cancer, mass, rigidity or suspicious appearing ulcer or lesion was considered a positive roentgenographic diagnosis of malignancy.

A positive diagnosis of malignancy by endoscopy consisted of an endoscopic impression of possible malignant change being present or if the biopsy was positive for cancer despite a benign endoscopic impression.

Surgical protocols and pathology reports were reviewed in all cases to determine attempted curative resectability of the lesions. The patients discussed in this manuscript were examined between July, 1967, and March, 1973.

Results

A total of 58 cases of malignancy of the stomach have been reviewed. Fifty-two of these tumors were adenocarcinomas and the remainder were malignant lymphomas. This represents approximately 10% of the total number of ulcers we have examined endoscopically. All diagnoses were established by surgical exploration and biopsy except for four patients who refused surgery. Each of these four had far advanced, easily recognized carcinoma on barium meal and endoscopic examination. Three of these patients had positive gastroscopic biopsies of carcinoma while the fourth patient was examined at a time when gastroscopic biopsy capability was not available (GTF-A used.)

There were 30 men and 28 women. The patients' ages were from 36 to 91 years with an average age of 70 years. The average age was not different in any of the categories listed nor in the resectable lesions as opposed to the metastatic group. The four youngest patients of the entire group (36, 39, 46 and 51) all had far advanced, unresectable disease.

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See editorial, page 870.

The symptoms were those typically ascribed to gastric pathology and consisted of pain, anorexia, weight loss and anemia. Forty-five of the patients had a chief complaint of pain with eating.

The criteria used to categorize patients regarding a positive roentgenographic or endoscopic diagnosis have been described in the methods section.

The patients were placed in the following groups:

- I. Positive diagnosis by Xray and endoscopy
- II. Normal or benign Xray diagnosis and malignant endoscopic diagnosis
- III. Delayed positive diagnosis by Xray, endoscopy or both
- IV. Missed diagnosis by Xray and endoscopy
- V. No Xray performed

I. Positive Diagnosis by Xray and Endoscopy
35 patients [63%]

This is the largest group of patients as one would expect. Thirty-five of 56 patients were diagnosed or suspected of malignant disease on the initial upper-gastrointestinal roentgenogram and endoscopic examination. In most instances a confirmatory endoscopic examination was promptly followed by surgical exploration. Four of the patients in this group had a malignant lymphoma.

Twenty-five of the 35 patients in this group had unresectable or widely metastatic disease present at the time of surgery (29% resectability). Seven of the remaining ten patients had disease localized to the stomach.

II. Normal or Benign Xray Diagnosis and Malignant Endoscopic Diagnosis
14 Patients [25%]

Fourteen patients with cancer had an UGI series with a benign ulcer described (nine) or the UGI series was simply interpreted as being normal (five). In each instance the endoscopic examination was either strongly suspicious of malignancy, and could not rule it out, or in one patient, a malignant biopsy was obtained from what appeared to be a benign ulcer not visualized on the x-ray examination. Nine of 13 biopsies in these 14 patients were positive for malignancy (one negative was lymphoma). Twelve of these 14 patients had resections performed (89%), although only two had negative nodes. Two patients had lymphoma, and both were localized, resectable disease.

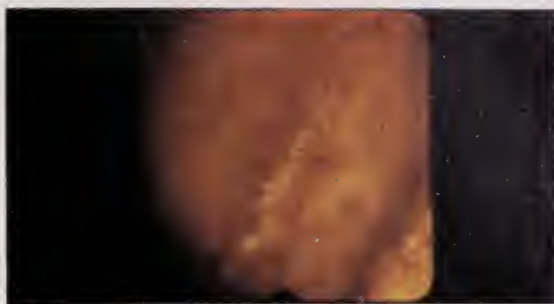


Fig. 1—Irregular mucosa overlying an infiltrating carcinoma. Biopsy showed atypical cells but not diagnostic of carcinoma. Xray detected a superficial ulceration. Operated because of symptoms.



Fig. 2—Malignant ulcer with a prominent, irregular rolled edge. Endoscopic biopsy positive for malignancy. UGI showed the lesion was "penetrating" and not malignant.



Fig. 3—Malignant ulcer thought benign at surgery. UGI series and endoscopy could not exclude malignancy and endoscopic biopsy was positive. No extension to lymph nodes at surgery.



Fig. 4—Far advanced, obvious adenocarcinoma of the stomach.

III. Delayed Positive Diagnosis by Xray, Endoscopy or Both (five patients [11%])

Five patients were ultimately diagnosed as carcinoma but a delay from three months to one year ensued between the time of the initial examination to the time of diagnosis. Two of these patients had a positive endoscopic impression and biopsy on the first examination, but this had been preceded by observation for three months of a poor healing gastric ulcer that was finally considered suspicious for malignancy on barium meal examination.

Two of the remaining three patients had been initially examined with a viewing only gastroscope (GTF-A) and follow-up endoscopy (three months and one year respectively) showed apparent carcinoma and the biopsy was positive. The third patient with a delay in both Xray and endoscopy diagnosis showed a poor healing large ulcer over three months time. Carcinoma was suspected on the last upper GI series. Biopsy at repeat endoscopy was positive as opposed to an initially negative biopsy.

IV. Missed Diagnosis by Xray and Endoscopy (one patient [1%]) (Figure 1)

This was an 83-year-old male who 20 years earlier had a gastrojejunostomy and vagotomy performed for duodenal ulcer disease. Because of pain and vomiting, upper-gastrointestinal roentgenogram and endoscopy were performed. Both showed deformity, atrophy, and a patent stoma. Endoscopy revealed a polypoid lesion in the antrum and a small ulceration. Biopsy was benign. In view of his symptoms, he was operated shortly thereafter and found to have an infiltrating, submucosal carcinoma beneath the ulcerated antrum. One adjacent lymph node was positive for malignant spread.

V. No Xray performed (two patients)

There were two men (ages 91 and 71 years) who were diagnosed as advanced carcinoma of the stomach at endoscopy with positive biopsies. Neither had an x-ray examination. Neither was resectable.

Endoscopic Biopsy

Forty-one patients out of the total of 52 patients with carcinoma had endoscopic biopsies with one patient being biopsied on two separate occasions. Thus, a total of 42 biopsies in 41 patients were performed. The remaining 10 patients with carcinoma were examined prior to the

availability of fiberoptic gastroscopic biopsy instruments.

Thirty-five biopsies were positive for carcinoma (83%). The single repeat biopsy was positive on the second examination (patient cited in subgroup III above). In the majority of these cases the positive biopsy provided very useful information in that it confirmed, at times, equivocally positive Xray and endoscopic impressions. In several patients the biopsy occurred with negative or benign roentgenographic impressions and a doubtful endoscopic visual impression of cancer.

The six patients with lymphoma all had biopsies performed. Two were interpreted as positive for adenocarcinoma and the other four were called inflammatory reaction, predominantly lymphocytic in variety. One of the positive biopsies occurred in a patient with hemorrhage, a negative GI series and a large fundal ulcer with lymphoma localized to the stomach.

In our total endoscopic "biopsy" experience of several hundred, we have had two instances of a false positive biopsy for carcinoma. One occurred with a large, bleeding posterior wall ulcer and negative x-ray examination. The other contradicted a benign ulcer roentgenographic impression and equivocal endoscopic visual impression. Both patients had large, benign gastric ulcers at subsequent surgical resection.

Discussion

The patients who are the subject of this review assuredly do not represent a random selection of patients with gastric malignant ulcer. Each has been selected for endoscopic examination on the recommendation of a referring physician. In a high percentage of cases, the radiologist has suggested endoscopy for confirmation or clarification of a gastric lesion. These same selection factors operate in most gastroscopic examinations, as a minority of physicians routinely obtain endoscopy on patients with ulcers, other lesions or unexplained gastrointestinal symptoms.

Despite the uncontrolled selection factors, some interesting results are apparent. Namely, utilizing both upper-gastrointestinal roentgenography and fiberoptic endoscopic examinations, a very high degree of accuracy can be obtained in the diagnosis of gastric cancer. If one relies entirely on the x-ray examination, a significant percentage of false negative examinations (26%—Group II) and delayed diagnoses (11%—Group III) can

result. It is here that endoscopy with biopsy demonstrates its usefulness. Only two of these 21 patients (groups II and III), were not diagnosed on the initial gastroscopic examination when combined with biopsy of the ulcer. The one patient of these two "misses" was correctly diagnosed on a follow-up examination with biopsy, and the second patient underwent prompt surgery despite negative Xray and endoscopy because of his symptoms. These data are very similar to our earlier experience in which all diagnoses of ulcer, either benign or malignant were critically reviewed.¹

Perhaps the most significant fact to be demonstrated is that an earlier diagnosis of cancer of the stomach is clearly associated with an increased rate of resectability and presumably curability. If one examines the ulcers diagnosed by *both* Xray and endoscopy as malignant, the rate of curative resection was 29%. On the contrary, of those patients diagnosed as having malignant ulcer only by endoscopic examination (16 patients), 14 (87.5%) had a curative resection. Excluding lymphomatous lesions, 12 out of 14 carcinomas underwent curative resection. Certainly not all patients undergoing "curative resection" will be cured of their disease. If resection cannot be performed no cure is possible at all. Follow-up data must be accumulated to decide the true cure rate in these patients.

These findings are furthermore in agreement with those previously published both in this country and in Japan. Comfort et al.² reporting on 220 small malignant ulcers and over 700 benign ulcers at the Mayo Clinic found a 32 percent erroneous diagnosis of benign gastric ulcer in gastric carcinomas under four cm. in size. It was in this group that the higher five year survival rate (60%) was present as opposed to those lesions called gastric cancer on x-ray study (32% five year survival). The accuracy of upper-gastrointestinal roentgenogram in diagnosing malignant ulcer increased with the size of the ulcer, approaching 80% in lesions over three cm. size and 58% for lesions less than two cm. While two-thirds of the cancers were over three cm., it was difficult to diagnose, smaller than two cm. carcinomas that a 71% five year cure rate was achieved. Brown and Cain³ reviewed 106 incidental gastric cancers found at surgical resection for presumed poor healing gastric ulcer. Again

the five year survival rate was size related, being 89% for lesions less than one cm. in size and 43% for those of 3-6 cm. size. Kasugai⁴ and Prolla⁵ have reviewed the Japanese experience in gastric malignancy. In Japan, gastric carcinoma is the most common malignancy with an incidence of 70/100,000 in males and 38/100,000 in females. This contrasts with United States figures of 19/100,000 and 10/100,000 for male and female respectively.⁶ Despite differences in incidence, the resectability and cure rates for invasive carcinoma are very similar in the two countries, being 15% to 50% depending on the presence of nodal metastases.⁷ Over a 95% cure rate has been achieved when "early" carcinoma is found and treated in a conventional fashion.⁴

Thus the challenge to eradicate the high mortality of gastric carcinoma can be met. The "early" or limited invasive carcinoma requires maximal diagnostic efforts. It is no coincidence that the introduction and acceptance of fiberoptic endoscopy in this country followed the development and widespread use of these instruments in Japan. The declining incidence of this neoplasm in this country does not eliminate its importance. Since we do not understand the reasons for its decreasing incidence, we have no guarantee that this situation will continue.

The symptoms of gastric malignancy while not always typical of peptic disease, are of no help in the differentiation from benign disease. And while the absence of acid after histolog stimulation mandates removal of an ulcer, the presence of acid is little security against the presence of cancer.²

The locations of benign and malignant ulcers is of little value in diagnosis as both occur more commonly on the lesser curvature of the stomach and in the lower one-half of the stomach.²

The reasons for failure of upper-gastrointestinal roentgenography to diagnose cancer when present may be multiple. In some instances the examination may be less than optimal due to poor patient cooperation. In others it may simply reflect the smallness of the lesion which has not yet developed the ominous characteristics of mass, rigidity and altered mucosal folds. These characteristics, by their nature, are associated with late or invasive malignancy.

Rigid criteria must be met to justify a conservative, non-surgical approach to the treatment of

gastric ulcer. Evidence of 50% healing in two to three weeks is mandatory. Endoscopic correlation and a negative biopsy lend a high degree of certainty to a benign roentgenographic impression. The presence of gastric acid is a necessity to allow an interval of healing to occur.

The problem of a normal upper-gastrointestinal roentgenogram with cancer being present, while uncommon, was present in five of our fifty-two patients. Aside from one patient with recurrent cancer in a Billroth II anastomosis, the other four patients were investigated because of pain or bleeding, and all had early carcinoma diagnosed at gastroscopy.

As noted, biopsy was very helpful in many equivocal lesions. Delay in endoscopic diagnosis doubtlessly could have been avoided in three out of four patients had this technique been available. This additional diagnostic refinement added to the new excellent fiberoptic esophagogastrroduodenoscopes has made endoscopic examination of the upper-gastrointestinal tract a crucial diagnostic test. Older² and even current reports⁸ that have suggested an insignificant role for endoscopy do not reflect the use of modern fiberoptic endoscopy that is now available in the practice of gastroenterology.^{9,1}

We feel that a diagnosis of gastric ulcer is an indication for endoscopic evaluation of the stomach. The presence of unexplained pain, weight loss, anemia or frank gastrointestinal hemorrhage

likewise require a consideration of esophagogastrroduodenoscopy. The risk is almost negligible with a trained endoscopist. Patient discomfort is low and the diagnostic yield is rewarding.

Summary

Fifty-two patients with adenocarcinoma of the stomach and six patients with primary malignant lymphoma of the stomach have been examined by fiberoptic esophagogastrroduodenoscopy. The combined accuracy of upper-gastrointestinal roentgenogram and endoscopy at the initial examination or within three months follow-up was 95% in the diagnosis of malignancy. Upper GI series alone suggested a diagnosis of malignancy of the stomach in 63% of the patients. The correct diagnosis was made at endoscopy and biopsy in 54 of the 58 patients on initial examination.

Resectability of the lesions was inversely related to size and was greater in those lesions thought benign on x-ray examination. Radiographic accuracy was directly related to the size of the carcinomas.

These malignant ulcers represent a selected ulcer population as not all gastric ulcers or carcinomas are examined endoscopically.

Acknowledgment

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Duodenoscopy and Retrograde Cholangiopancreatography

A New Method for Diagnosis of Obstructive Jaundice

PAUL B. DICKINSON, M.D.,* and ALPHONSO A. BELSITO, M.D.*

DIAGNOSIS OF the cause of jaundice can on many occasions be accomplished by clinical and laboratory data, but, in some individuals accurate diagnosis demands demonstration of the patency or lack of patency of the bile ducts. In patients who have obstructive jaundice, preoperative demonstration of the anatomic site and cause of obstruction provides very useful information at the time of surgery. Until recently, opacification of the bile ducts in the jaundiced patient for roentgenographic recording could only be accomplished by injection of contrast medium into the bile ducts by the percutaneous transhepatic method or the transjugular technique.^{1,2} The availability of sophisticated fiber duodenoscopes has made possible another method of obtaining high quality cholangiograms. With these instruments, the duodenal papilla can be located and under direct vision a cannula placed in the Ampulla of Vater through which contrast medium is injected in a retrograde fashion to opacify the biliary and/or pancreatic ductal systems.³⁻⁷

The following report assesses the value of this new procedure, duodenoscopy with retrograde cholangiopancreatography, in the investigation of individuals suspected of having obstructive jaundice.

Material and Methods

The patients in this series were seen in the private practice of consultative internal medicine and gastroenterology. The clinical and biochemical data of jaundiced patients was reviewed and if hepatitis could be reasonably excluded these patients were considered candidates for the retro-

grade endoscopic approach. An attempt was made to obtain diagnostic information by intravenous cholangiography if the serum bilirubin was 6 mg% or less. If intravenous cholangiography was not possible or non-diagnostic and the patient was an acceptable candidate for exploratory laparotomy, duodenoscopy and retrograde cholangiography were attempted.

The instrument used was the JF-B fiberoptic duodenoscope manufactured by the Olympus Corporation. The CLE Olympus light source was used for all of the examinations. The instrument has a working length of 1200 mm., is 10 mm. in diameter, and has an internal channel through which a cannula can be passed into the field of vision. The examinations were performed in five different community hospitals and since the equipment is portable, the same instrument was used for all of the examinations.

The procedure is performed in a radiology examining room that is equipped with fluoroscopy and a television monitor. Video-tape synchronization with instantaneous replay capability is ideal because it decreases radiation exposure to the patient, personnel, and the instrument. Patient preparation is the same as for upper GI endoscopy. Glucagon and atropine are administered intravenously as needed during the procedure to paralyze the duodenum. The techniques used to locate and intubate the duodenal papilla have been described by Vennes and Silvis.⁷

The contrast medium used is methylglucamine diatrizoate-60. The contrast medium is injected with gentle manual pressure and the injection is continually monitored by fluoroscopy. If the gallbladder is intact, up to 40 cc of contrast medium can be safely placed in the biliary tract. The roentgenographic techniques used have been previously reported.⁸

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Results

Duodenoscopy with retrograde cholangiopancreatography was attempted in 266 patients. Jaundice of uncertain etiology was the primary indication for the procedure in 56 of these 266 patients. Results of attempted cholangiopancreatography in these jaundiced patients are graphically illustrated in Figure 1. Papillary intubation was not accomplished in two. In one patient the papilla could not be identified and in another patient a mass deformity of the duodenal loop from carcinoma of the head of the pancreas caused such distortion of the duodenal anatomy that cannulation was not attempted. The papilla was cannulated in 54 patients. These 54 were classified in four ways according to the ductal system, if any, which was opacified. Figure 1 presents the results in that fashion: Group I-Cholangiogram only—five, three of these five cholangiograms were abnormal. Group II-Cholangiopancreatogram—26; 24 of these 26 studies were abnormal for the reasons listed in Figure 2. Group III-Pancreatogram only—19; five of these 19 pancreatograms demon-

strated a dilated and poorly draining duct. These five patients had carcinoma of the head of the pancreas. Group IV-No retrograde flow in either ductal system—four; all of these patients had ampullary obstruction. Figures 2, 3 and 4 are representative of abnormal cholangiograms.

An adequate cholangiogram in summary was obtained in 31 of the 56 jaundiced patients, and in six patients, the pancreatogram alone was diagnostic for the cause of jaundice. An endoscopic diagnosis of carcinoma of the head of the pancreas was made in two patients in which cholangiography was not successful. Therefore, duodenoscopy with retrograde cholangiopancreatography was of diagnostic value in 39 of the 56 patients (72%).

There were 23 patients (Groups III and IV) in which the papilla could be intubated but contrast material could not be injected into the biliary tract. Ten of these 23 had surgically proven ampullary obstruction from neoplasm, calculus, or stricture. The remaining 13 were judged to be technical failures because intravenous cholangiography performed during remission of jaundice, or operative

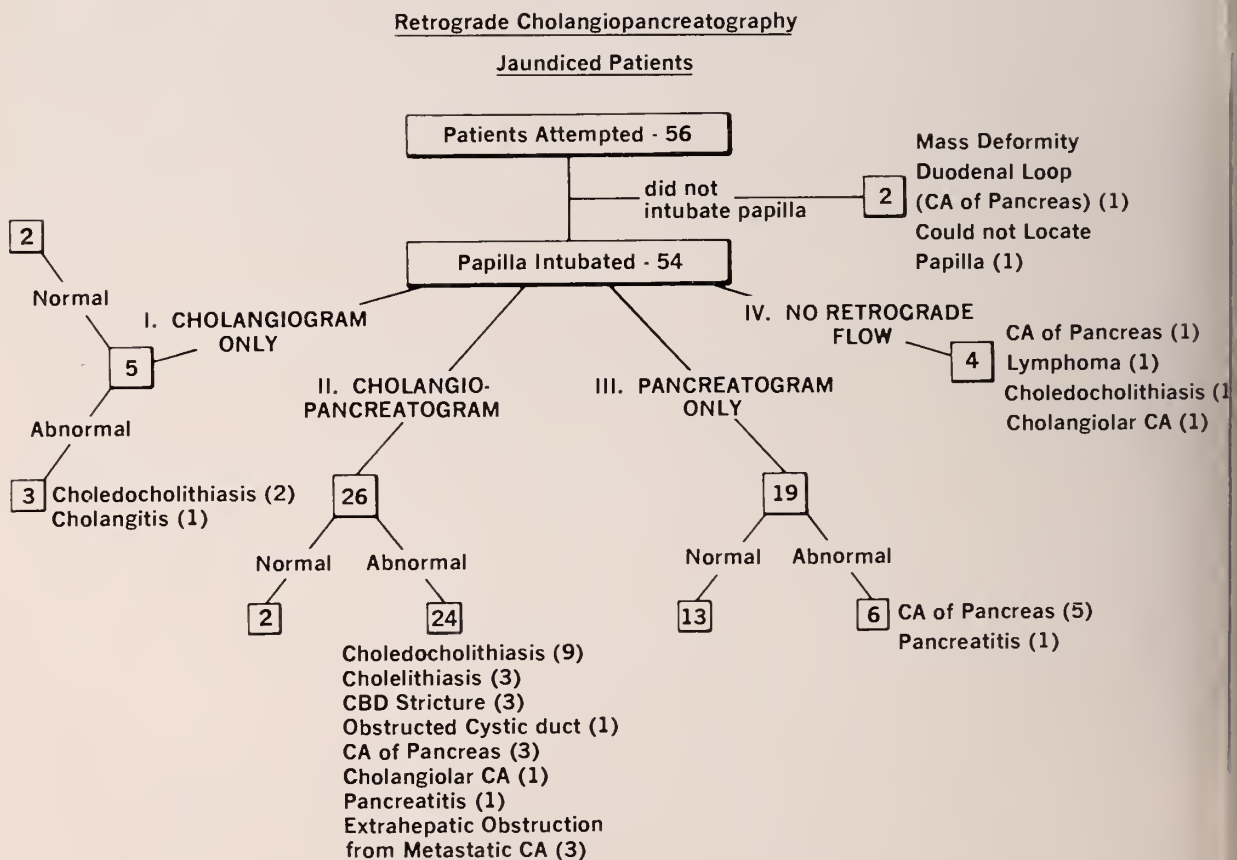


Fig. 1—Results of duodenoscopy with retrograde cholangiopancreatography in patients suspected of having obstructive jaundice.

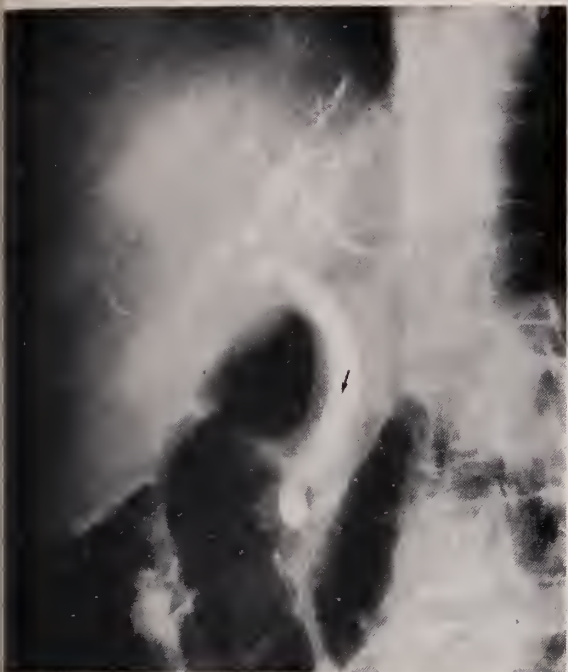


Fig. 2—Retrograde cholangiogram of a 76 y.o. female who had sudden onset of right upper quadrant pain 36 hours prior to procedure. Arrow points to 12 mm. calculus in the mid common bile duct. Pancreatic duct partially dilated. Radiolucent defects in pancreatic duct represent air bubbles.



Fig. 3—Retrograde cholangiopancreatogram obtained in a 72 y.o. female who presented with painless jaundice. Biliary and pancreatic ducts are obstructed from carcinoma of the head of the pancreas. The lesion was unsectable.

cholangiography, disclosed normal biliary ducts. It is significant that 10 of these 13 technical failures occurred in our first 100 attempts with the procedure.

Complications

Elevations of serum or urine amylase occurred in 80% of the patients studied. The greatest elevations occurred in the individuals that had pancreatography. These amylase elevations were transient, returning to normal by 18 hours after the procedure. Patients occasionally experienced brief mid-abdominal and/or back pain with injection of contrast medium. The severity and duration of pain was poorly correlated with the amylase rise. Cholangitis with sepsis was the most serious complication. This complication occurred in three patients. These individuals all had common bile duct obstruction. We have not encountered this complication since initiating a program of prophylactic antibiotics and immediate surgical decompression of the obstructed duct.

Discussion

Duodenoscopy with retrograde cholangiopancreatography was attempted in 56 patients with suspected obstructive jaundice. The anatomic site of biliary tract obstruction was located in 33 patients and the biliary tract was demonstrated to be patent in four others. The alternative to



Fig. 4—Post-hepatic obstruction by metastatic synovial sarcoma. Z—irregularly compressed common bile duct; X—Dilated cystic duct, (previous cholecystectomy); O—dilated common hepatic duct.

performing endoscopic cholangiopancreatography in these patients would have been a period of observation followed by transhepatic or operative cholangiography if indicated. The diagnosis could have been established by these conventional diagnostic approaches but not without exposing the patient to greater risk. The operative mortality in obstructive jaundice is directly related to the duration and severity of the jaundice.⁹ Exploratory laparotomy can be hazardous if the patient has hepatitis.¹⁰ Therefore, a period of observation is prudent unless obstructive jaundice can be established soon after onset of jaundice. The transhepatic method can demonstrate the site of obstruction and in one series has provided a high success rate.¹¹ This is not a uniform experience and the transhepatic method is generally used as a preoperative procedure.^{1,12} The retrograde method avoids the risk accompanying the transhepatic method and commitment of the patient to surgery. The working approach towards suspected obstructive jaundice should include an attempt at the retrograde method first. If the retrograde method is not successful an attempt at transhepatic cholangiography should then be considered before surgical exploration.

Blumgart et al. were able to establish a definitive diagnosis in 75% of 87 jaundiced patients

by endoscopic cholangiopancreatography.¹³ A similar success rate in jaundiced patients has been reported by Cotton et al. (77% of 30 patients) and Vennes and Silvis (78% of 26 patients).^{7,14} It is to be emphasized that this report and other publications concerning the value of this new procedure include early attempts during which the technique was developed.^{15,16,17} Our success rate in obtaining diagnostic information has improved with experience and modifications in technique and cannula design.

The value of endoscopic cholangiopancreatography in the jaundiced patient is its unique ability to establish, at low risk, without precommitment to surgery, the anatomy of the bile and pancreatic ducts early in the course of jaundice. With this information a firm diagnosis of the cause of jaundice can be established, unnecessary surgery avoided, and appropriate surgery commenced without delay.

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An increased risk of thromboembolic disease associated with the use of hormonal contraceptives has now been shown in studies conducted in both Great Britain and the United States. Other risks, such as those of elevated blood pressure, liver disease and reduced tolerance to carbohydrates, have not been quantitated with precision.

Long-term administration of both natural and synthetic estrogens in subprimate animal species in multiples of the human dose increases the frequency of some animal carcinomas. These data cannot be transposed directly to man. The possible carcinogenicity due to the estrogens can be neither affirmed nor refuted at this time. Close clinical surveillance of all women taking oral contraceptives must be continued.

Indication—Ovulen and Demulen are indicated for oral contraception.

Contraindications—Patients with thrombophlebitis, thromboembolic disorders, cerebral apoplexy or a past history of these conditions, markedly impaired liver function, known or suspected carcinoma of the breast, known or suspected estrogen-dependent neoplasia and undiagnosed abnormal genital bleeding.

Warnings—The physician should be alert to the earliest manifestations of thrombotic disorders (thrombophlebitis, cerebrovascular disorders, pulmonary embolism and retinal thrombosis). Should any of these occur or be suspected the drug should be discontinued immediately.

Retrospective studies of morbidity and mortality conducted in Great Britain and studies of morbidity in the United States have shown a statistically significant association between thrombophlebitis, pulmonary embolism, and cerebral thrombosis and embolism and the use of oral contraceptives. There have been three principal studies in Britain¹⁻³ leading to this conclusion, and one⁴ in the United States. The estimate of the relative risk of thromboembolism in the study by Vessey and Doll³ was about sevenfold, while Sartwell and associates⁴ in the United States found a relative risk of 4.4, meaning that the users are several times as likely to undergo thromboembolic disease without evident cause as non-users. The American study also indicated that the risk did not persist after discontinuation of administration and that it was not enhanced by long-continued administration. The American study was not designed to evaluate a difference between products. However, the study suggested that there might be an increased risk of thromboembolic disease in users of sequential products. This risk cannot be quantitated, and further studies to confirm this finding are desirable.

Discontinue medication pending examination if there is sudden partial or complete loss of vision, or if there is a sudden onset of proptosis, diplopia or migraine. If examination reveals papilledema or retinal vascular lesions medication should be withdrawn.

Since the safety of Ovulen and Demulen in pregnancy has not been demonstrated, it is recommended that for any patient who has missed two consecutive periods pregnancy should be ruled out before continuing the contraceptive regimen. If the patient has not adhered to the prescribed schedule the possibility of pregnancy should be considered at the time of the first missed period.

A small fraction of the hormonal agents in oral contraceptives has been identified in the milk of mothers receiving these drugs. The long-range effect to the nursing infant cannot be determined at this time.

Precautions—The pretreatment and periodic physical examinations should include special reference to the breasts and pelvic organs, including a Papanicolaou smear since estrogens have been known to produce tumors, some of them malignant, in five species of subprimate animals. Endocrine and possibly liver function tests may be affected by treatment with Ovulen or Demulen. Therefore, if such tests are abnormal in a patient taking Ovulen or Demulen, it is recommended that they be repeated after the drug has been withdrawn for two months. Under the influence of progestogen-estrogen preparations preexisting uterine fibromyomas may increase in size. Because these agents may cause some degree of

fluid retention, conditions which might be influenced by this, such as epilepsy, migraine, asthma, cardiac or renal dysfunction, require careful observation. In breakthrough bleeding, and in cases of irregular bleeding per vaginam, nonfunctional causes should be borne in mind. In undiagnosed bleeding per vaginam adequate diagnostic measures are indicated. Patients with a history of psychic depression should be carefully observed after the drug discontinued if the depression recurs to a serious degree. The possible influence of prolonged Ovulen or Demulen therapy on the pituitary, ovarian, adrenal, hepatic or uterine function awaits further study. A decrease in glucose tolerance has been observed in a significant percentage of patients on oral contraceptives. The mechanism of this decrease is obscure. For this reason, diabetic patients should be carefully observed while receiving Ovulen or Demulen therapy. The age of the patient constitutes no absolute limitation for, although treatment with Ovulen or Demulen may mask the onset of the climacteric. The pathologist should be advised of Ovulen or Demulen therapy when relevant specimens are submitted. Susceptible women may experience an increase in blood coagulation following administration of contraceptive steroids.

Adverse reactions observed in patients receiving oral contraceptives—A statistically significant association has been demonstrated between use of oral contraceptives and the following serious adverse reactions: thrombophlebitis, pulmonary embolism and cerebral thrombosis.

Although available evidence is suggestive of an association, a relationship has been neither confirmed nor refuted for the following serious adverse reactions: neuro-ocular lesions, e.g., retinal thrombosis and optic neuritis.

The following adverse reactions are known to occur in patients receiving oral contraceptives: nausea, vomiting, gastrointestinal symptoms (such as abdominal cramps and bloating), breakthrough bleeding, spotting, change in menstrual flow, amenorrhea before and after treatment, edema, chloasma or melasma, breast changes (tenderness, enlargement and secretion), change in weight (increase or decrease), changes in cervical erosion and cervical conditions, suppression of lactation when given immediately postpartum, cholestatic jaundice, migraine, rash (allergic), rise in blood pressure in susceptible individuals and mental depression.

Although the following adverse reactions have been reported in users of oral contraceptives, an association has been neither confirmed nor refuted: anovulation post treatment, premenstrual syndrome, changes in libido, changes in appetite, cystitis-like syndrome, headache, nervousness, dizziness, fatigue, backache, hirsutism, loss of scalp hair, erythema multiforme, erythema nodosum, hemorrhagic eruption and itching.

The following laboratory results may be altered by the use of oral contraceptives: hepatic function: increased sulfobromophthalate retention and other tests; coagulation tests: increase in prothrombin, Factors VII, VIII, IX and X; thyroid function: increase in PBI, butanol extractable protein bound iodine, and decrease in uptake values; metyrapone test and pregnanediol determination.

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Editorials

Fiberoptic Endoscopy

THIS ISSUE OF MINNESOTA MEDICINE is devoted to fiberoptic endoscopy which has found a place in several specialties of medicine and surgery, substantially within the past decade. Undoubtedly, diagnosis and treatment have been most affected in the field of Gastroenterology as reflected by the papers appearing in preceding pages.

Morrissey's¹ review of gastroscopy in 1967 provides a brief chronicle of the early application of fiberoptics to the gastrointestinal tract. At that time, instruments which allowed reasonably accurate and complete visualization of the stomach had just come into use. The duodenum was only inconsistently visualized. Instruments with biopsy capability were being introduced but had not found widespread use.

In the few years since then, we have seen the development and distribution of a new generation of gastrointestinal fiberoptic endoscopes which allow for safe, comfortable and accurate inspection of the esophagus, stomach, duodenum and colon. Directed biopsies can be taken without undue risk providing for accurate differentiation of benign from malignant lesions, as well as determination of the specific type of malignancy.[†] When used carefully and consistently, gastroscopy with biopsy should allow a rational therapeutic approach to gastric ulcers without the lurking un-

certainty as to whether a lesion is occultly malignant. Diagnosis of malignant lesions should be obtainable immediately, without the traditional follow-up Xrays to demonstrate lack of healing, and earlier surgery may then be possible.

Cannulation of the pancreatic and common bile ducts can now be accomplished relatively easily, and contrast Xrays obtained of these duct systems thus aiding in the differential diagnosis of jaundice and adding another means of investigating the elusive pancreas. These techniques are dealt with in the contributions by Dr. Vennes[‡] and Drs. Dickinson and Belsito.[#]

Perhaps the most interesting development in gastrointestinal endoscopy is the therapeutic application of these instruments with removal of polypoid lesions from the colon as discussed by Chally and Blackwood[§] and gastric polypectomy.[¶] It will be of great importance to determine the impact of early polyp removal on the occurrence of carcinoma in the stomach and colon, but at least, resective biopsy is an important step forward in accurate diagnosis.

Similarly, gains have been made in the examination of the tracheobronchial tree as reported by Stubbs and Rosenow^{||} and the utilization of laparoscopy[°] (Johnson and Smith).

These new tools have already had significant impact in the clinical practice of medicine, and it is exciting to contemplate the improved instrumentation likely to develop within the next few years with resulting improvements in patient care.

A. P. Kaplan, M.D.*
Guest Editor

Reference

1. Morrissey John F, Tanaka Yoshihisa and Thorsen William B: Gastroscopy. Progress in Gastroenterology 53:3: 456, 1967.

*Clinical Assistant Professor, Department of Medicine, University of Minnesota, Minneapolis, and Director, Gastroenterology Laboratory, Mt. Sinai Hospital, Minneapolis.

†See page 840.

‡See page 843.

#See page 859.

§See page 850.

¶See page 847.

||See page 831.

°See page 836.

NRMP Reports

WITH THIS ISSUE subscribers to MINNESOTA MEDICINE receive a supplement containing 21 reports covering 29 Research and Development activities supported by Northlands Regional Medical Program (NRMP) during the past year. I am proud to have been given the opportunity to serve as "Guest Editor" of a supplement for the second time within 12 months. Derivation of the theme behind contents of the two issues reveals a fundamental change from emphasis on continuing education of health professionals to multiple problems relating more specifically to improved delivery of health care services. Problem areas include quality of care, more relevant health manpower and improved accessibility. The "state of the art" is analyzed; plans are presented for improvements; and demonstrations are reported with evaluation of results.

The 46 authors in the present series did a commendable job in presenting results of their studies in a concise and understandable manner. The enthusiasm of these and other NRMP project personnel has been stimulating and infectious. Four additional articles originally planned for this series could not be completed in time for publication. Areas covered include: evaluation of care in the Intensive Care Units of 67 Minnesota Hos-

pitals, demonstration of primary prevention rheumatic fever and two additional studies ambulatory care. These interesting project activities will be reported later in this or other journals.

It was an additional pleasure for me to arrange for the nine editorials in this issue which help interpret the significance of the reports presented.

As NRMP is phased out or radically changed, special recognition is appropriate for members of the program staff—both past and present. Several are authors of articles in this series, and two others were authors in the December 1972 supplement. About 25 other members of the professional staff have contributed significantly to these and other NRMP activities during the past six years even though they have not received recognition as authors in "Minnesota Medicine." Most staff members who have left or will soon leave NRMP have secured employment in other health-related institutions in Minnesota. The people participating in NRMP—staff, project personnel, Board, Regional Advisory Group, and Committees—constitute the most important legacy of this program for constructive improvements in health care in Minnesota.

Winston R. Miller, M.D.
Guest Editor

Northlands Regional Medical Program (NRMP)*

MINNESOTA MEDICINE with this issue publishes the second supplement provided by the NRMP (The first was the supplement to the December 1972 issue).

NRMP has examined the cost and distribution of health care in Minnesota, and this report is undoubtedly the most complete on the present local condition. We are a hard-working profession as Hill, Miller, and Campbell† point out and their survey indicates we work about 55 hours a week, see 100 patients in the office per week (if we do not practice in the Mayo Clinic) and spend 35% of our time in the hospital. We are well paid, earning the national average about 39.5 thousand dollars annually. Obstetricians earn the most, 15% above the average, and pediatricians are low

on the totem pole, less 8.5%. We are just beginning to employ nurse practitioners and other types of physician's assistants. Several papers in this supplement deal with these assistant types. There are a number of interesting programs in the state established or under consideration devoted to the training of such assistants: St. Cloud, the University of Minnesota and the Mayo Clinic. With the continued unmet need for medical services there is no doubt these assistants will be called upon more and more in the years immediately ahead.

A medical group in Virginia is making use of a computer to analyze their own practice as reported by Friedlieb.‡ They improve the quality of their work by reporting to their colleagues the

*Supplements to MINNESOTA MEDICINE are published at no expense to the Minnesota State Medical Association or MINNESOTA MEDICINE.

†See page 58 of the Supplement.

‡See page 44 of the Supplement.

performance versus criteria. Thus they now know that with the diagnosis of acute bronchitis their records show mention of sputum production in only 26% of their cases. With this information available to their clinic physicians it is likely the next survey will show greater attention to this detail.

In Virginia it costs a patient \$40-\$50 per year for physician care if he has diabetes or ischemic heart disease (chronic illness). Acute diseases such as cystitis or otitis media cost \$14-\$25. (I hesitate to parade these figures for fear our Twin

Cities patients will flock to the Range for their care. These are modest charges indeed.)

NRMP in its seven years of existence has made an important contribution to medicine in Minnesota and the upper midwest. The region and the nation have benefited by its work in coronary care units, in assessing medical needs in the area, in indicating how urgent medical problems are likely to be solved. We owe a debt to NRMP and to its only director throughout its existence, Winston Miller.

Reuben Berman, M.D.
Editor

Flexible Fiberoptic Bronchoscopy

STUBBS AND ROSENOW* have in their paper on flexible fiberoptic bronchoscopy given us a beautiful account of this new procedure. They with their large experience point out the many details which have to be considered to realize its full potential. Their paper should be read carefully by those interested in taking advantage of this technique. Flexible bronchoscopy does not replace the classical procedure but complements it in equal proportion. Rigid bronchoscopy has to be used with bleeding or in the treatment of foreign bodies because of the small channel in the flexible instrument. A great advantage of the latter is that it can be inserted into the segmental bronchi which can be examined and brushed directly. Further, it is much easier on the patient. There is a controversy as to whether the instrument should be passed through the nares or with an endotracheal tube. The use of the latter, as they indicate, is probably better because it allows the instrument or brush to be removed repeatedly for cleaning or sampling. Stubbs and Roscnaw

emphasize that since the newer procedure is not so disagreeable as the old, haste can be avoided and follow up studies undertaken. They repeat that good anesthesia requires time and careful preparation. Logistic implications of this new development can be anticipated. The authors conduct flexible bronchoscopy adjacent to the operating room area. I believe this is very important because the instrument is being touted as something which can be used by anyone on the wards or in the office. The combination of a patient with lung disease, local anesthesia, and the introduction of tubes through the airway may produce cardiac arrhythmia or even arrest. Patients should have their electrocardiogram monitored during the procedure and adequate personnel ought to be available if complications arise. Finally, this instrument is delicate and must be handled gently both in its cleaning and use. Its introduction is one of the important advances in our armamentarium over the past decade.

Raymond Read, M.D.
Little Rock, Arkansas

*See page 831.

Luverne W. Johnsrud, M.D.

A memorial fund in the honor of the late Dr. Luverne W. Johnsrud has been established with the Minnesota Medical Foundation at the University of Minnesota. The purpose of the fund which exceeds \$10,000 is to assist needy medical students with long term low cost loans to finance their medical education at the University of Minnesota or UMD. Iron Range Area students will be given priority consideration in the disbursement of the loan funds.

Gastric Malignancy

Gastroscopic Experience

ENDOSCOPY OF the upper gut has enjoyed a renaissance in the past five to 10 years, following the introduction of flexible fiberoptic instruments. These allow a safe, relatively comfortable examination. Areas previously inaccessible can be visualized and biopsy capabilities give additional advantage. But the true role of endoscopy in specific patients and in specific conditions has not yet been well defined. Anecdotal reports and ill-defined patient selection might lead the casual reader to overestimate its value.

Belsito and Dickinson* help us to some extent. They review 58 cases of proven malignancy occurring in 600 patients with ulcerating gastric lesions. These 58 were divided into five groups on the basis of endoscopic and roentgenographic diagnosis (or lack of diagnosis) of the malignancy.

Results in their 15 patients (26% of the total) in group II clearly establish endoscopy as being useful in selected patients. Whereas the roentgenograms of all of these patients had been reported as "negative" or "benign gastric ulcer," endoscopy in all of them provided a correct diagnosis of malignancy. But it is quite disturbing that apparently in only one of the 15 patients was biopsy positive, the rest apparently having either no biopsy or a negative biopsy. Another disturbing point is that, with respect to these other 14 patients, the authors were able by gross evaluation of the lesion to say only "suspicious for malignancy" or "can't rule out malignancy." Let the experience of these highly qualified endoscopists be a caution to the inexperienced "hobbyist" who dabbles in endoscopy (for the fun of it—or for more ulterior purposes). And, probably more importantly, let it be a caution to those who would refer patients to him.

This article, while reaffirming that endoscopy *can* be of value, still leaves us seeking an answer to the larger question of when (and sometimes whether) one should use it in evaluating a specific gastric lesion. For example, in four of the five patients in group III ("delayed diagnosis") a positive endoscopic diagnosis was indeed made when they were first examined. But in all four the ulcer had not healed over three to 12 months,

which in itself is an indication for operation. What if any extenuating circumstances existed to prompt the endoscopy? And with respect to group I (both roentgenographically and endoscopically positive) one must also ask how many patients *needed* the endoscopy. How many had a large mass, or other roentgenographic signs (or evidence from history, physical examination, and laboratory testing), that indicated a need for operation? How many would have undergone operation even if the endoscopist had reported a benign lesion? Some patients may have had associated conditions that made operation undesirable until more conclusive proof of malignancy was obtained, but how many?

Two patients (one in group III and one in group IV) had cancer that was not correctly diagnosed by endoscopy, either grossly or with biopsy. This observation should be viewed not as a condemnation of the procedure but rather as a realistic commentary that no procedure, even the best, is infallible.

Criticism of endoscopy has arisen from within and without the medical profession. Claims of overuse, overcharge, lack of value, and inaccuracy of diagnosis have certain justification. Minnesota is fortunate in having several groups who have had long-standing experience in endoscopy. Such groups have an opportunity to define the proper place for their procedure. And the first question, as they hammer out this definition, should be, "Do the results of the examination in any real way alter the patient's diagnosis or management? Unless and until the answer to this question is sought and defined for a specific patient or a specific condition, endoscopy must tend to remain at the level of the automated blood tests; for example, everyone gets a bilirubin determination whether he needs it or not. The collaborative efforts of an endoscopist, a surgeon, a radiologist, and a gastroenterologist not practicing endoscopy would give balance to an investigative team. A retrospective study would be very helpful; a prospective study, while harder to do, would be even better.

Philip W. Brown, Jr., M.D.
Rochester, Minnesota

*See page 854.

Gynecologic Laparoscopy

LAPAROSCOPY BOTH diagnostic and for the performance of procedures such as tubal sterilization has become firmly established in the past one to two years. Where the procedure was hardly known a short time ago, it is quite common on the surgical schedule of any large hospital.

The equipment in use today has been improved and simplified so that its use is relatively simple. Nevertheless, the procedure is not without potential problems. Abdominal wall hematomas, bowel perforations by trocar or cautery tip, bladder injuries, bleeding from biopsy sites of tubal sterilization are well known.

The authors of Gynecologic Laparoscopy* mention that acid base balance from CO₂ absorp-

tion is not a problem due to the short time the pneumoperitoneum is present. However, in the course of training in the techniques of laparoscopy a longer operative time can lead to problems.

Johnson and Smith also mention that catheterization is not necessary. Anyone that has done a laparoscopy on a patient with a full bladder knows the difficulty he has in visualizing the pelvic organs and cauterizing the tubes if sterilization is to be carried out.

The laparoscope will be used more and more often in the future. Good surgical technique should be used and the procedure respected as something more than a quick minor operation.

E. William Haywa, M.D.
Minneapolis, Minnesota

The Minnesota Cervical Cancer Mortality Study

IN THIS ISSUE, there is a preliminary report* from the Committee of Obstetrics, Gynecology and Maternal Health of the Minnesota State Medical Association. It deals with their study of about one-third of those patients who died from cervical cancer during 1971-72. A large part of the report deals with the principles which have been applied and indirectly with the committee's hopes. This is designed to acquaint Minnesota physicians with the general character of the study. It has not progressed sufficiently to justify more than a sketchy report with little in the way of firm conclusions.

The hopes of the committee are based on what is now a recognized conclusion that, in theory at least, the frequently occurring cervical carcinoma can be identified by simple and widely applicable means in its earliest stage when it is for practical purposes completely curable. Failure to achieve such efficiency is the result of faults which are correctable and which involve, among others, both patients and physicians. The committee hopes to define these as they affect local conditions so that they may be corrected.

In reading this report one must bear in mind

the danger of errors inherent in drawing generalized conclusions from material samples limited by definition. The same risk has been recognized by the Minnesota Maternal Mortality Study of obstetric material. These are both studies of deaths, many of which, in some and sometimes considerable degree, are preventable. They are likely then to abnormally concentrate unhappy circumstances which are not necessarily those to which the whole population is subject. The present report states: "Treatment for recurrent or persistent disease . . . Four of these had radical surgery. Except for one postoperative death, the patients succumbed to recurrent disease . . ." Since only deaths are included in the study, this statement indicates nothing whatever as to the adequacy or effectiveness of surgical treatment of persistent or recurrent disease. In lesser degree, the same principle applies to other conclusions.

It is unwise to draw generalized conclusions from such material. However, as from the Maternal Mortality Study, useful information can be obtained. It is this for which the Cervical Cancer Mortality Study is searching. Unacceptable circumstances in prevention, diagnosis and treatment in Minnesota can be found and measures taken to

*See page 9 of the Supplement.

change these. Even though the frequency with which these occur is unknown, the recognition of a few is useful information. That this approach may be effective in the gynecologic cancer field is prettily demonstrated by the gratifying improvement in cure rates in recent years of patients with adenocarcinoma of the endometrium and those with carcinoma of the vulva. Cervical neoplasms offer much greater possibilities of response to ideal handling. The prospect is so pleasing that all of us will take pleasure in the effort to cooperate.

The limitations of a study of mortalities are evident. The details to be derived from such a very early preliminary study are inevitably sketchy. The hope is that a mechanism can be devised which will allow studies of the factors involved in those who survived. So many questions come to mind. What, in Minnesota, is the degree of

efficiency of smear taking and, in particular, of smear-reading? What interpretation is the physician placing on someone else's reports of smears, whether positive, atypical or negative? What further procedures are being carried out for these? What is the overall efficiency of the histologic interpretation of tissue obtained by various means? What is the reality of the reaction to a reported diagnosis of so-called carcinoma in situ? What effect has present understanding of the use of the various tools for diagnosis and treatment had on the total pattern of carcinoma of the cervix in Minnesota? What can be expected from educational pushes in one or other direction? And so on, almost ad infinitum. It is urged that this committee address itself to methods of obtaining such information. The rewards promise to be great.

John L. McKelvey, M.D.
St. Paul, Minnesota

Health Care Delivery

THIS ISSUE OF MINNESOTA MEDICINE is destined to be one of the most referred to issues in the coming years as we see that it begins to address itself to the responsibilities that are being clearly left at the health care industry's door.

Recent legislation has made it clear to all of us that all participants in the delivery of health care in general, and physicians in particular, are to be held accountable for the effective quality assurance program. It has further been recognized that quality assurance has two components, and these components are quality assessment and quality control.

Each of these dimensions is being directed toward three issues: (1) necessity of service rendered, (2) appropriateness of the service (quality and facility), and (3) surveillance of expensive and unusual services.

The aforementioned mandate has become part of the Federal regulatory effort with respect to Medicare and Medicaid patients. We must ask ourselves whether, as professional people, we don't have a responsibility which sweeps beyond that. This responsibility is that of assuring medical care to the entire population of this state. To this end, Northlands Regional Medical Program has taken a mature approach. We have seen, as witnessed in the articles by Friedlieb,* as well as Kraus and

Hanson,* that the skills incident to evaluating ambulatory medical care can be mounted at reasonable costs and directed toward continuing improvement of the quality of medical care within the ambulatory setting. Fortunately, we have seen these same skills applied by Layer and Erickson* in the nursing home setting. These are areas of responsibility not now covered by legal mandate and perhaps through the extension and application of the lessons learned by these authors, we may have an opportunity to see medicine assume the initiative, to enable itself to function without further extension of a regulatory bureaucracy into these areas.

Central to all of the above articles, as well as the article concerning the monitoring of hospital quality and productivity by Upham and Lillquist* is the recognition of the central role the medical record plays in the health care delivery system. It is of interest that the problem oriented medical record as it is addressed by Asp and Brashear* in one article and by Savett and Good* in another, each in and of itself created an activity which in the process of displaying how care was delivered, initiated a change mechanism whereby care could be even further improved.

These articles, then, make it clear that we have the opportunity to carry out evaluatory efforts of all services afforded all patients entrusted to our

*See pages 44, 49, 36, 24, 12 and 19 of the Supplement.

ands. Furthermore, from these efforts, change mechanisms can be mounted which need not threaten or punish.

I am convinced that this unusual granting activity through providing multiple seed grants within the state of Minnesota will be looked on years to come as having been one of the most effective programs our government has ever

undertaken. Now that we have identified the capacity for ongoing review in numerous areas, there is no reason why we should not hold ourselves to the application of these skills wherever patients are served.

Richard E. YaDeau, M.D.
St. Paul, Minnesota

Patient Health Education and the Future

HEALTH CARE IS currently undergoing numerous transitions. Part of that change includes involving the patient or consumer in the overall planning and management of his own disease state. Most of us as physicians have been trained in the traditional principles of the management of acute disease entities or emergency conditions in which we provide an immediate or "active" service to a "passive" patient. The major demands for health care today, however, are no longer conditions that are primarily emergent in nature. The leading causes of death and disability in the United States are now chronic conditions such as heart disease, stroke, diabetes, kidney problems, arthritis, obesity, alcoholism, etc. These entities currently cannot be cured but most of them can be controlled. The most important person in the control of these diseases is the patient himself and members of his family. This means that without the cooperation of an informed, motivated patient, we, as health professionals, are virtually powerless to carry out effective management. To accommodate to these changing needs, effective health care must include not only competent history taking, physical examinations, use of the laboratory and appropriate prescriptions, but also the education and preparation of the patient to carry out an active role in disease management. Undoubtedly most of us, if asked, would reply that we are already providing a great deal of patient education in our offices and in the hospitals we utilize. As we read Mrs. Verstraete's* article "Patient Education In A Health Sciences Center" in this issue of MINNESOTA MEDICINE, most of us would have to re-define our meaning of "education."

National surveys have given us some insight as to just how effective health professionals have been in the education of the general public. In a

National Health Survey, Dr. Glen MacDonald of the U. S. Public Health Service reported that only 10% of diabetics given a dietary prescription demonstrated sufficient knowledge of the subject to carry out the instructions. In a recent Louis Harris Poll, it was found that almost one-third of the respondents could not name even one of the seven warning signs of cancer. When one thinks of the tremendous amount of information distributed in physician's offices, hospitals, and through the American Cancer Society regarding this one area of health, the lack of effective means and modes of patient education is frightening.

Today, consumerism is a popular tidal wave sweeping through many fields and beginning to engulf the health care field. Consumers are demanding to be placed in responsible positions where they have input not only into current health care programs but also in its future planning.

Those of us who already seem overly-busy in practice have grave concerns about the time commitments such educational programs may require. It is important that we understand that this process may not have to be carried out by the physician himself, but other health professionals may be as well or even better qualified to plan, develop, and implement patient education programs. It's encouraging to know that the University of Minnesota will be initiating this concept in their health care curriculum in the fall of 1973. Certainly consumers have been demanding knowledge and input into the management of their disease and the response of the health professions is overdue. Hopefully we can provide knowledge, insight, and increasing capabilities on the part of health professions to fulfill these needs.

The awareness and use of community, state, or regional patient educational resources can also be utilized effectively; for example, the Diabetes Education Center in Minneapolis provides an exten-

*See page 31 of the Supplement.

sive five-day patient education experience where patients and their family members may be referred for an intensive five-day course. Patients then return to their own physicians for ongoing support and care. In our experience at the Center we are repeatedly impressed by the number of patients who ask at the end of the class week, "Why hasn't

this information been taught to me before?" The informed consumer quickly realizes his role in his own care as well as the importance of patient education which permits him to carry out his responsibilities in the management of his own disease.

Donnell D. Etzwiler, M.D.
St. Louis Park Medical Center
and Diabetes Education Center

Effective Rehabilitation Education

REHABILITATION HAS two features which contribute to the complexity of a continuing medical-education program.

It is a comparatively new field, having evolved primarily from the polio epidemics and problems of World War II; therefore, the exposure to rehabilitation in most medical schools' curricula has been limited. As a result many physicians have had to develop an empirical knowledge of the physical modalities and their applications to various diseases and disabilities.

Secondly, to a greater extent than in most other health-care areas, allied health professionals, nurses experienced in long-term care, physical therapists, occupational therapists, etc. are utilized in the rehabilitation field. This diversity and the fact that many persons are involved contributes to the physician's concern about the effective utilization of rehabilitation services, the costs of these services, and the technical competence of the therapists. As a result a continuing medical-education program in rehabilitation must present materials related to patient selection, therapy service utilization, and therapist supervision rather than a singular emphasis on the technical and physical properties of the modalities.

*See page 39 of the Supplement.

The effectiveness of this approach is demonstrated in the article "Improving Rehabilitation Through Continuing Medical Education."* The results support the involved study's hypothesis that a well-planned continuing-education program for the medical staff of a community hospital would: (1) change the characteristics of a physical therapy treatment, and (2) change the patient referral process patterns. In addition the program resulted in a modification of utilization pattern which could be interpreted as the establishment of standards of quality for rehabilitation care in the Northfield City Hospital.

It is of interest that the methodology was developed by professionals who were well acquainted with the needs of the community. Miss Deschler a former practicing physical therapist; Dr. Wood who for many years was a colleague in family practice; and the Northfield City Hospital medical staff were able to identify the topics which would contribute to improved rehabilitation care in the community. This approach in itself assured the success of the educational effort, enabling the authors to relate that the "receptivity by the (medical) staff was enthusiastic."

Loren R. Leslie, M.D.
Minneapolis, Minnesota

Improved Health Care System

WILKINS¹ TRACES the recent development of the Area Health Education Center (AHEC) and the Community-Based Health Education Council (CHEC) mechanisms for facilitating needed improvements in the delivery of health services. Both approaches constitute exploratory efforts to articulate stronger functional relationships among educational institutions, providers and consumers of health services and health professionals in the

community. Both developments grew out of a national trend, spurred by the Carnegie Commission on Higher Education,² the Millis report,³ and consumer concerns, to find a more effective and rational system for the delivery of health care especially in chronically underserved rural and urban locations. Both serve the objectives of providing more and better health manpower by means of coordinative mechanisms which will help estab-

ish genuine and sustainable cooperative bonds between educational programs and the providers and consumers of health care.

The CHEC program is designed to elicit initiative for cooperative effort at the local level while the AHEC utilizes the health sciences center as a focus for developing cooperative programs. As Wilkins points out, the approaches are not mutually exclusive and lend themselves to complementary arrangements for planning, implementation and evaluation of specific programs.

The threat of loss of federal funds for CHEC operations seriously undermines this innovative attempt to improve the effectiveness of health professionals in the community and to increase the responsiveness of the health manpower production system to each planning area of the State. One year is not sufficient to evaluate the community-based model for strengthening cooperative relationships among the varied components of the health care system and for exploring the relationship between the CHEC and AHEC mechanisms. The accomplishments outlined by Wilkins for this first year are most impressive. The expressed commitment of each CHEC to continue operation reflects a unity of purpose which will hopefully be sustained with state and local funds if federal support is withdrawn. The recommendations of a special task force for the State Comprehensive State Planning Agency and the reinforcement provided by the Higher Education Coordinating Commission, as outlined by Wilkins, provide additional support for the need to explore the community-based concept until a reasonable test of its validity can be established.

The account by Draine and Rustad² of the Higher Education Coordinating Commission's effort to generate planning guidelines for nursing education provides an excellent example of HECC's statewide coordinating role in health personnel development. The voluntary mode of coordination encourages open information flow, richly varied group participation and reliance upon data and expertise. It should contribute heavily to the development of a more rational and progressive health manpower production system for the State.

The Advisory Committee on Nursing Education, formed as a part of this effort, performs a crucial role toward synthesizing interests and resolving differences in outlook among the participating educational systems, constituencies of the

multilevel role structure of the nursing profession, nursing students, provider institutions and public representatives of each planning area of the State.

While the project's scope was necessarily limited to supply and demand considerations, the approach should have wide generality in determination of need and specification of quality requirements, not only in nursing education but in other areas of health personnel development as well. Coordination of a myriad of interest groups, for example, is direly needed in allied health education, where a burgeoning proliferation of new programs threatens to add chaos to an already fragmented array of existing programs.

The article by Schnarr and Hessian³ deals with one of the most important and difficult educational issues confronting any multilevel discipline: career mobility from entry to the highest level of competence afforded by a profession. The issue is complicated further by a growing recognition that career goals can change in lateral as well as upward directions. Career goals frequently change with discovery of latent aptitudes and abilities and with attainment of new skills in a functional setting. Acknowledgment of career mobility as a guiding value in educational planning can be understood as an outgrowth of an increased societal commitment to equality of opportunity, whether directed to minority and culturally disadvantaged people or to competent health personnel who are locked into a designated level by an inflexible credentialing system which does not recognize experience-based learning and proficiency.

Schnarr and Hessian delineate the many problems encountered by the experienced nurse in search of a baccalaureate degree and outline the sequence of events which produced a set of challenge examinations. These examinations were designed to objectify individual attainment of concepts and competencies as a basis for determining credit equivalencies toward fulfillment of the requirements of a nursing major.

This was one of several designs to emerge from deliberations of a *Task Force on Career Mobility in Nursing*. Complementary career mobility programs being developed by the University of Minnesota School of Nursing and the Minnesota Nursing Association indicate that the nursing educators of Minnesota are providing timely leadership in this crucial area of educational change.

The underlying rationale and methodologies in-

volved in the programs described in these three articles represent at different levels of application the rapidly expanding commitment of health care educators and professionals to articulate more effective relationships between the community and the health manpower education system. Such efforts should contribute to the development of more skilled health care personnel, better utiliza-

tion and geographic distribution of personnel, improved opportunities in health careers and a more informed and involved consumer of health services—major ingredients of an improved health care system.

Manfred J. Meier, Ph.D.
Coordinator, Allied Health Programs
University of Minnesota

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Reality Testing Profiles of Medical Practice

IF THE PROFESSION of medicine is unaware of existing medical practices and the public's expectations of those practices, we are indeed lost. Speeches about supposed problems and their solutions will not orient us. Our need is information concerning what is reality.

Minnesota's citizen generally feels he gets good medical care but there are some problems concerning distribution of care, time lags and costs. He feels medicine should show leadership in solving these problems.* The medical profession feels that progress is being made toward increasing the quantity and quality of medical care available to our citizens. Northlands Regional Medical Program involvement in determining these attitudes is significant and now *Profiles of Medical Practice* adds more dimension to the picture by showing what Minnesota's primary and direct patient care physicians are doing along with some insights as to how they are doing it.

The study shows Minnesota physicians now delegate many parts of their work to a significant degree while the public controversy over delegation to and certification of allied health professionals continues.

Using 1969 and 1970 national averages, we find our 54 hour week is 7% longer and we see

9% more patients while spending a few hours less in direct patient care and work one week less per year; also it costs us more in overhead to generate approximately the same net income per year. The patterns of practice among the various specialty sub-groups are shown not to be the same. Hopefully the physician community will evaluate these discrepancies and their implications.

One thousand five hundred and five (44%) of Minnesota's 3,383 primary direct patient care physicians supplied information about their practices. The authors under Northlands Regional Medical Programs auspices analyzed the data and present to us as "*Profiles of Medical Practice*."[†] Whether we discuss medical education, medical care, delivery or distribution, physicians income, delegation of medical care tasks or a host of other problems, this study increases our understanding of where we are now. That is the first step in rational goal determination and the required foundation for implementing action to reach these goals.

Dull statistical reading? Perhaps some will find it so. Inaccurate? Not likely, at least for 44% of Minnesota's physicians. Invalid because of sample bias? Probably not but to be sure you would have to ask the 1,878 non-respondent physicians who failed to help medicine know itself better.

G. B. Martin, M.D.
Thief River Falls, Minnesota

*The Minnesota Health Care Opinion Survey, Northlands Regional Medical Programs, Inc., Comprehensive Health Planning Agency, Minnesota Blue Cross-Blue Shield, November 1971.

[†]See page 58 of the Supplement.

The Physician's Assistant versus the Nurse Associate

[N THIS ISSUE OF MINNESOTA MEDICINE are two articles that present diametrically opposing stands concerning allied health personnel and allied health professionals." It is to the credit of the Northlands Regional Medical Program that these opposing views reflect the NRMP Policy of sponsorship of studies encompassing a broad approach to health care problems.

In their opening paragraph Anderson, Cooley, and Sparrow* discuss changing relationships creating "a need for expanding and redefining the roles . . . the change or metamorphosis of roles . . . of the nurse." "The development of the nurse to her full potential." An historical review follows but nowhere do the authors become specific concerning the opening paragraph.

Although the five objectives cited in the text failed to meet the goals of the opening paragraphs, the authors do develop some interesting material:

1. The courses were taken to the nurse student in rural areas.
2. The courses were designed to serve that long neglected group, the diploma nurses.
3. *The gain in objective medical knowledge by the nurse-trainees was not statistically significant* as demonstrated by pre- and post-course testing.
4. Consumer reaction was good.
5. Defining the dimensions of the nurse practitioner's role in health care delivery has not been accomplished as yet.
6. Continuation of funding was not accomplished.

In the other article Gonzalez* outlines the history of the Physician's Assistant Program and develops two main objectives:

1. Documentation of the need and feasibility for physician assistants.

2. Planning the educational program.

Under the need or feasibility studies, she cited five areas:

- a. Local physician support is definitely positive.
- b. Despite the rejection of physician assistants by organized nursing, nursing support is surprisingly good (90%).
- c. Because of site selection, the scope of this study is skewed toward respiratory, muscle, gyn, and physical examination.
- d. The concise description of the delegatory problem by Gonzalez is the high point of the paper. It is apparent that broad (possibly national) coalition of Pharmacy, Nursing, and Optometry against physician delegation is effective in Minnesota.
- e. Funding is constantly a problem.

The educational planning of curriculum content, length of program and admission policy indicate a moderate departure from existing programs to fit the needs of the college geographical area.

Doctor Gonzalez has presented a course description of a model for the training of a Category I Physician's Assistant in a specific college area.

Of special note is Doctor Gonzalez's recognition of the continuing national pressure of non-medical health "professions" in their apparent self serving attempt to limit delegation by physicians. If 90% of the nurses recognize that delegation by physicians is beneficial to the patient and to the health care system, why is organized nursing so unresponsive to its constituents by condemning delegation to physician assistants? The encouraging note from both of these articles is the broad expanding approach of the Northlands Regional Medical program in the study of health care.

Robert Hugh Monahan, M.D.
St. Paul, Minnesota

*See pages 69 and 64 of the Supplement.

Minnesota Academy of Family Practice

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Deprived Medical Care

FOUR ARTICLES in this issue of MINNESOTA MEDICINE are reports of study projects supported by Northlands Regional Medical Program. Each, in some way relates to areas of deprived medical care, and one may note sociological implications.

Two of these studies describe projects designed to define the health status of specific groups of people. One such group was rural, middle class, and white; the other was mixed urban-rural, poor, and Indian. Two of these studies describe projects designed to provide health care in medically deprived communities. One describes the effort to provide medical care within the main stream of American medicine by use of the paramedical aide working in close correlation and under the supervision of an established, multi-specialty clinic. The other describes an attempt to provide health services (as opposed to medical care) by a mobile health unit staffed by nurses and operating abreast of the main stream of American medical care. Although the subject matter in each article seems widely separated from that of the others, there is a common theme, and certain correlations can be drawn.

A study reported here by O'Leary, Zaki and Alexander* indicates that the health status of certain groups may be difficult to define. From this one may deduce that health needs for such a group may be difficult to define, and therefore difficult to provide appropriately.

In contrast, the study reported by McCreary, Deegan and Thompson* describes vividly the health status of their group, and leaves no question that the Indians of Minnesota are deprived medically by any measure of care that one may choose. Associated with this is profound economic

and sociologic deprivation. The authors depict well the interface that exists between health professionals and the Indians, and their suggestion for breaching this barrier is worthy of study by all who provide services to under privileged, minority people.

The study by Snyder and Setter,* as well as that by the Mayo Clinic group* describe interesting projects designed to bring health care into communities where it had not been readily available. The two methods presented are quite in contrast, and one might argue the advantages of one approach as compared to the other. It appears that one or both may gain use in the future. More experimentation is required, and before either of these may gain wide use, certain professional, legal, and ethical standards must be more clearly defined.

Northlands Regional Medical Program has become inoperative due to recent withdrawal of federal funds from support of a wide range of humanitarian activities. The wisdom of this decision at the federal level has been disputed. Also, the need to rely upon the federal government for this support has been questioned. In any case, the old order is changing and with it medical care also. New methods to clarify old problems, and to define new problems must be sought; and new means to resolve these problems must be developed. Northlands Regional Medical Program is to be commended for supporting worthy performance in this area of "sociologic" medicine. Without Northlands Regional Medical Program a void is left. It remains to be seen if this void will be filled, and if so how. One thing is certain, if the void remains, progress in this vital area will be stifled.

J. Gibson McClelland, M.D.
Virginia, Minnesota

*See pages 82, 87, 91 and 97 of the Supplement.

Wesley W. Spink Lecture

October 15-19

Dr. Michael Wilson Fox, a veterinarian and associate professor of psychology at Washington University, St. Louis, Missouri, and a pioneering authority on the behavior of dogs and wolves, will deliver the second biennial Wesley W. Spink Lectures on Comparative Medicine during October at Carleton College and the University of Minnesota.

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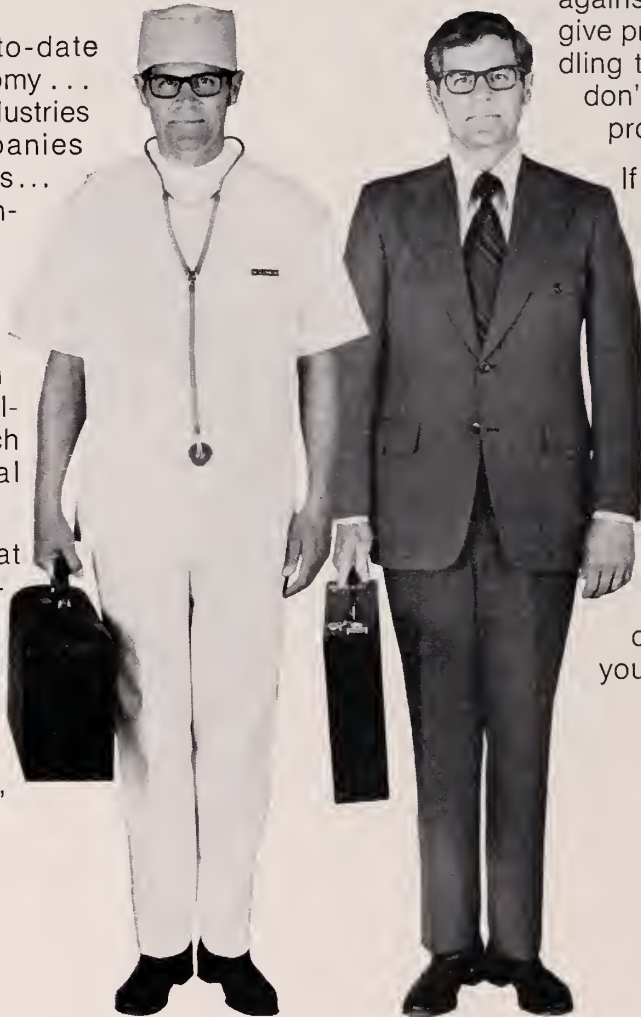
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Letter to the Editor

Cooperation-Competition-Conflict

Concentric Circles of Continuing Comprehensive Care

At the present time the main elements in providing health care are doctors, hospitals, public health departments and third party payors. Think of each of these elements as separate circles and the patient as a fifth circle trying to stay away from all of the delivery circles. As he gets sick, however, the circles move together and we find that there are areas of overlap. The overlap represents areas of potential cooperation, competition and conflict. Cooperation if the patient is hospitalized. Competition in various emergency room and hospital outreach programs. Conflict when insurance policies force patients to use hospital facilities to obtain coverage or when a hospital tries to actually deliver medical care to an area.

Remember a hospital does not, cannot and should not provide medical care but is only one place where that care can be provided.

Delivery of medical care by a hospital usually starts in the guise of medical education with students and residents and a paid staff to teach them and "free" clinics and beds for that teaching. The next step is a hospital based and subsidized clinic to serve an "unmet health need" in an area around the hospital. This area around the hospital then gradually enlarges until each of the hospitals have isolated their slice of the metropolitan pie. Hospital supported paramedical personnel can be trained to check blood pressures, do well baby exams and run various patient instruction programs. These varied and valuable programs do provide a community service while at the same time they attract patients to the hospital. Beds must be kept full to justify overbuilding.

Making your services known is all you have to do if there is a real "unmet health need" in an area. Knocking on doors in a high rise or taking a patient by the hand and bringing him to the hospital is too much like Marcus Welby. It is patronizing and demeaning. Individual patients cannot be spoon fed their medical care. They must take some initiative and responsibility in seeking it out. The time and money devoted to "drumming up business" could better be spent in lowering the cost of, or improving the provision of the acute services that have made our hospitals the best in the world.

Each of the elements of care have their sphere of influence, their thing—that which they do best. Complete, comprehensive, continuing cradle-to-grave preventative medicine is not what hospitals do best. Hospitals should limit themselves to that which they do best; provide a place for the provision of sophisticated episodic care at the lowest possible cost.

Any broadening of this focus on acute care is a wasteful duplication of services one of the other elements can do better and cheaper. A hospital cannot be all or do all things for all people. Its resources, though immense, are finite and must be conserved and concentrated. A hospital is a thing to be avoided. It belongs on the periphery of the circle of medical care, rather than in the center of the circle radiating its expensive services in the community outreach programs.

These programs, instead of lowering the cost for acute care, make the acutely ill patient subsidize the cost of these teaching and outreach programs. They are valuable programs and they need to be done but not by the most expensive element of our delivery system. All this does is encourage more people to use the high priced hospital laboratory and x-ray and clinic facilities rather than the more economical services that can be provided in physicians' offices.

Doctors are as guilty as hospitals in teaching their patients to think of the hospital as the center of the "medical care" system. We are guilty not just on weekends and evenings when we direct our patients there for "emergency" services but also during the week when we admit for diagnostic studies that could be done more cheaply and efficiently in our offices.

Each hospital Executive Committee should instruct the Long Range Planning Committee of their Board of Trustees that hospitals can better serve their communities by improving or lowering the cost of acute care services than they can by trying to provide a complete package of care.

Each hospital Executive Committee should carefully consider all additional steps taken in the direction of expanding rather than concentrating services; for the costs are additive and the consequences are geometric with ever widening competing and conflicting concentric circles of comprehensive care.

John E. Smith, M.D.
Minneapolis, Minnesota

IT'S THE LAW

Judgment for Failure of Bone Implantation

The patient sustained a lower back injury in an automobile accident and underwent a laminectomy of L4 and L5 vertebra. A spinal fusion was performed. In performing the surgery, the surgeon used as a grafting material, a product known as Bo-Plant.

The back pain continued and three years later, at the time of a second operation, the Bo-Plant had been partly reabsorbed and had to be removed.

The patient brought action against the drug company supplying Bo-Plant. He claimed negligence, breach of implied and expressed warranty and fraud.

Bo-Plant was made by processing bone from an unborn calf. Clinical studies showed the implantation to be 85-95% successful and the material had been approved by the Food and Drug Administration.

The drug company contended that the patient did not prove that the Bo-Plant used in the patient's operation was defective. The court said that it must clearly prove that there was an actual adulteration of the product in order for the company to be liable for harm resulting from its use. The court found that there was no evidence to support a finding that the drug company ignored, concealed or suppressed adverse medical reports concerning failures experienced in the use of its product. The court found that the company was not guilty of breach of implied warranty, negligence or fraud.

Theodore A. Peterson, M.D.
Minneapolis, Minnesota

E. R. Squibb & Sons, Inc., vs. Stickney, 274 South 2nd, 898 (Florida District Court of Appeals, March 8, 1973) The Citation.

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*Shakespeare: Much Ado About Nothing. IV.i.35-36.

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Bronchopulmonary Dysplasia in a Premature Exacerbated by Oxygen Therapy

for
Pneumomediastinum and Pneumothorax

MARTHA BURKE-STRICKLAND, M.D.* and CHARLES A. ROGERS, M.D.†

HIGH AMBIENT OXYGEN has been used to facilitate removal of loculated air in the chest of newborns.¹⁻³ The need for caution in using this method of treatment in prematures because of their vulnerability to retrolental fibroplasia is well recognized.^{1,3} The following case suggests that caution is also needed in the use of high ambient oxygen for therapy of pneumothorax and pneumomediastinum in an infant at risk from bronchopulmonary dysplasia (BPD).

Case Report

A 1,400 gram infant was born at 30 weeks gestation by breech delivery to a 20-year-old primigravida. Spontaneous vaginal bleeding secondary to marginal sinus rupture heralded the onset of the five hour labor. The one minute Apgar score was two. When the baby did not respond to assistance with a positive pressure mask and 40% oxygen, she was intubated and given direct ventilatory assistance per endotracheal tube. The five minute Apgar score was eight. She was extubated and transferred to the newborn intensive care unit in a warmed transport incubator. One-half hour after birth, while on 30% oxygen, her blood pH was 7.33, pCO₂ 49 mm Hg, and pO₂ 110 mm Hg. Increasing tachypnea, grunting, and changes in the chest Xray over the next 48 hours were consistent with moderate respiratory distress syndrome (RDS). By 72 hours of age, the baby required 60-70% oxygen to maintain an arterial pH of 7.3 and a pO₂ between 50 and 100 mm Hg. This ambient oxygen concentration was continued for 34 hours. She did not require any other ventilatory assistance and the expected resolution of the RDS began on the fifth day. A chest Xray at that time showed possible early bronchopulmonary dysplasia. By the tenth day she was able to tolerate room air. Her color was pink. Respirations were stable and easy at 60-70 per minute though she still

had occasional sternal retractions. On the twelfth day, increasing duskiness and dyspnea prompted reinstitution of oxygen therapy. A chest Xray revealed moderate pneumomediastinum. Initially her cyanosis was relieved by 35% oxygen but later in the evening she began having repeated episodes of apnea accompanied by bradycardia. Re-Xray showed increase in the pneumomediastinum and extension to a right pneumothorax.

Fifty minutes of 100% oxygen therapy improved the infant. It was decided that the conservative approach (inhalation of 100% oxygen) would be continued. Twenty hours of continuous 100% O₂ was followed by another three days in which the ambient O₂ ranged from 50-95%. Her measured arterial pO₂'s did not exceed 104 mm Hg.

By the seventeenth day, after four days of high ambient oxygen, the pneumomediastinum and pneumothorax were resolved but the infant still required 25% ambient oxygen to maintain satisfactory blood gases and pH. On the 19th day, she again experienced increased retractions, tachypnea, and cyanosis which required 50% oxygen for relief. Xrays did not show any recurrence of pneumomediastinum or pneumothorax. Blood and tracheal aspirate cultures were negative.

By the 25th day, linear densities interspersed with fine cystic honeycombing were quite evident on the chest Xray. This was interpreted as further extension of BPD. Cor pulmonale, evidenced by tachycardia, tachypnea, and rapidly increasing liver size, responded well to digitalization. Supportive nebulization, physiotherapy, and antibiotics were continued for three weeks. She was gradually able to tolerate room air again.

She was discharged on Lanoxin at age two months weighing 3,010 grams. Her respirations were comfortable with slight retractions at 50 per minute. The chest Xray still showed increased linear densities fanning out from hilar areas into lateral portions of lung parenchyma. Scattered fine flocculent areas of increased density were also present. This was interpreted as residual BPD. Her arterial pH was 7.44 and the pCO₂ 29 mm Hg and pO₂ 63 mm Hg on room air. Lanoxin was discontinued at a two weeks follow up visit. At one year of age the child appeared clinically well. There was no evidence of retrolental fibroplasia and the chest Xray showed marked improvement with only faint linear densi-

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ties residual in the parenchyma. After breathing 100% O₂ for 15 minutes, her arterial pO₂ was only 77 mm Hg.

Comments

While risk of retrolental fibroplasia was weighed in the decision to use oxygen therapy in management of the pneumomediastinum and pneumothorax in this infant, the additional risk of bronchopulmonary dysplasia was poorly appreciated at the time. During the treatment period, her arterial pO₂ was not allowed to exceed the limits currently considered acceptable for protection of the premature retina.^{4,5} However, the four day period of high ambient oxygen therapy before resolution of the pneumomediastinum and pneumothorax did exceed the safe limits in terms of oxygen toxicity to the premature lung. Anderson et al. found changes of BPD invariably present in infant lung tissue after 30 hours exposure to high ambient oxygen. Progressive changes were found to occur with increased length of exposure.^{6,7} Clinical recovery with gradual improvement in the damaged lung is known to occur as it did in this case.^{8,9,10,12} However, criteria are not yet established for determining reversibility either generally or for a given infant.

In addition to dose-time relationships of oxygen effect upon the lung, production of BPD appears to be greatest when toxic effects of oxygen are superimposed upon underlying pathology of the lung.⁸⁻¹⁰ While the condition of the newborn most often reported in association with sequelae of oxygen therapy has been RDS, the potential for developing BPD seems to be present in any

respiratory problem of the neonate that requires high ambient oxygen.^{11,12} Since symptomatic pneumomediastinum and pneumothorax are often related to situations that have required vigorous resuscitation,^{13,14} the chances are high that underlying lung tissue damage from hypoxia and acidosis will also be present. The infant may thus be more vulnerable to BPD if 100% oxygen therapy is employed to facilitate removal of loculated gases from the chest. Alternative therapy, aspiration or closed chest drainage, also carries some risk. Srouji found increased survival in those treated with thoracostomy compared with those who had only medical treatment.² This infant did survive but hospitalization was prolonged beyond the time expected for prematurity and mild to moderate RDS alone. Probably some compromise of lung function resulted from the initial RDS and oxygen therapy but there is little doubt that the extra four days of high ambient oxygen made the loss more severe. In retrospect, it was felt that aspiration or tube thoracostomy probably would have relieved the symptoms more promptly and shortened the need for increased ambient oxygen therapy.

Since it is not yet known at which point the effects of oxygen toxicity may still be reversible and when they are not, it would seem reasonable to avoid this risk for the premature whenever possible. It is suggested that aspiration or closed chest drainage may be better choices than the use of 100% oxygen for the relief of symptomatic pneumothorax and pneumomediastinum in the premature infant.

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First Trimester Abortion*

JANE E. HODGSON, M.D.[†] and KATHEY C. PORTMAN, B.A.

A SURGE OF ACTIVITY is evident around the country among members of the medical professions in an attempt to implement the new abortion laws. It is important that the facts regarding the proper techniques, settings, and complications be presented in a straight-forward manner.

We would like to emphasize where, when, and how pregnancy terminations should be performed and to discuss the complications of first trimester procedures in some detail as well.

Where should first trimester pregnancy terminations be performed? We view the free-standing clinic now as the main source of delivery of this highly specialized procedure. The free-standing clinic can terminate first trimester pregnancies far more economically and expeditiously than the usual hospital. Treatment can be individualized and humanized more readily in a free-standing clinic than in the impersonal and highly regimented hospital.

There is a great struggle going on between two factions in many hospitals as to whether or not the procedure will even be done. Problems concerning the personal objections of the physicians and para-medical personnel are constantly arising. The patient will suffer if some of the hospital staff view the procedure with disapproval. Sympathy and empathy are obvious requisites of humane medical services.

It is also obvious that a wide-spread effort must be made to reduce costs of medical care. With pre-admission screening, and hospital review committees, many hospital procedures will soon be assigned for out-patient treatment, regardless of insurance coverage. This is the only way that the high cost of medical service will be curtailed. Free-standing abortion clinics are pioneering the way for delivery of many surgical and medical services on an out-patient basis.

When is pregnancy termination best performed?

Terminations should be performed during the first trimester prior to the 12th week after the last menstrual period (LMP—10 weeks gestation). This is the most important single factor in reducing complication rates.

A great effort must be made by the medical profession to emphasize the lower complication rates in first trimester abortion and to educate the public, particularly the young teen-ager. Evidence of success in this effort is the fact that 85% of pregnancy terminations done in New York at the present time are performed in the first trimester.¹ At Preterm Clinic, Washington, D.C., 50% of our terminations are done on patients that are eight weeks LMP or less.

How should first trimester pregnancies be terminated? Vacuum aspiration under local anesthesia has proven the safest technique. There is very little place for D&C under general anesthesia.

Free-standing abortion clinics have well demonstrated the increased safety and economy of vacuum aspirations done on an out-patient basis under local anesthesia with "no-touch" technique.²⁻⁵ The importance of integrating this service with counseling, contraceptive services, and sterilization has been emphasized.² Local anesthesia permits the blending of the surgical procedure with the entire counseling process.

Procedure

In the successful "model" clinics^{2,5} the patient, previously registered by telephone, is present in the facility for an average three to four hours. The history is taken, followed by a physical examination to confirm the duration of the pregnancy and to rule out any medical complications which might be a contra-indication for an out-patient procedure. Laboratory studies include Rh typing, hematocrit, urinalysis, cervical cultures for gonorrhea, and tests for ferning of cervical mucus and pregnancy. After a one-to-one counseling period, termination is performed. The counselor accompanies the patient through the entire procedure, which is performed under a

*Presented at the 120th Annual Meeting of the Minnesota State Medical Association, Minneapolis, Minnesota, 25 May 1973.
[†]Medical Director, Preterm, Washington, D.C.

paracervical block (1% lidocaine). No perineal "prepping" is done, nor are sterile drapes employed. Operators use sterile gloves during cervical dilatation and uterine evacuation. No unsterile object is allowed to enter the uterine cavity. The "soft" technique using flexible cannulas (Karman) is usually employed when pregnancy is less than eight weeks LMP. Minimal cervical dilatation is performed with the least possible force by use of the Pratt dilators, which are far superior to the more commonly known Hegar dilators.

Rh₀ (D) Immune Globulin (Human) is administered when indicated. Contraceptive devices are supplied at this time, and the patient is taken to the recovery area. It is rarely necessary to keep the patient more than an hour.

Complications

And what are the complication rates which follow such a radical departure from our conventional surgical routines?

When we talk about complications following pregnancy terminations, it is necessary to define our terms. We must consider:

1. The stage of gestation, and
2. The method of termination (which varies with each trimester).

In the first trimester, the method is usually vacuum aspiration, or a D&C under general anesthesia. The latter has a higher complication rate than vacuum aspiration. For the second trimester, during which a procedure carries a three to five times higher risk than the first trimester, the technique used may be vacuum aspiration (up to the 14th week) followed by either saline induction or hysterotomy. Dr. Tietze's most recent figures on the incidence of the various types of procedures in 1972 in New York's women resident patients were as follows¹:

Suction Aspiration	67.0%
D&C	15.5%
Saline	12.0%
Hysterotomy	0.8%

The mortality rates of the above procedures were recently given by Dr. Jean Pakter of the New York City Health Department based upon the New York City experience⁶:

Pregnancy Termination.	
all methods	4.0 deaths/100,000
Vacuum Aspiration	0.4 deaths/100,000*

*There was one death following vacuum aspiration in the first year of legalized abortion (July 1970-July 1971), and no deaths occurred in the second year (July 1971-July 1972).

D&C	2.5 deaths/100,000
Saline	16.5 deaths/100,000
Hysterotomy	222.8 deaths/100,000

We must further classify complications as to the time when they occurred, namely whether they were:

Pre-existing Complications: An example of pre-existing complication is the fact that between .5 to 1% of our patients have positive gonorrhea cultures. These women are asymptomatic, but one would expect that a patient with a positive gonorrhea culture would be more inclined to develop a severe complication. Interestingly, this group has been remarkably free of any postoperative problems and convalescence has been smooth. Other examples of pre-existing complications would be congenital uterine anomalies, ectopic pregnancies, hydatidiform moles, and latent pelvic infection.

Immediate Complications: The immediate complications are uterine perforation, hemorrhage, anesthetic reactions, and also cervical lacerations. These are diagnosed at the time of the procedure and studies of incidence rates of immediate complications should not be affected by any lack of proper follow-up studies.

Early Complications: Except for the immediate complications, abortion patients rarely have any serious problems for two to three days. If hospitalization is required, it is rarely sought before two or three days after the initial procedure. The commonest early complication is retention of secundal tissue, causing the well-known triad of symptoms, bleeding, fever, and pain. Many patients will respond to antibiotics and do not require the additional trauma of re-evacuation.

Delayed Complications: A fourth type of complication is the delayed or latent type, the incidence of which we are rather uncertain at the present time. We have not had legalized abortion in this country for a long enough period of time to study the women who have had procedures done under the proper circumstances. There is a trend at this time to deplore the possibility of delayed late complications.⁷ Obviously, there has not been enough time in this country to develop statistics on any so-called delayed complications, such as premature labor in subsequent pregnancies, increased spontaneous abortion, increased premature labor, ectopic pregnancies, and various other pregnancy accidents. In order to compute delayed complications, it has been necessary to

FIRST TRIMESTER ABORTION

ely on retrospective studies rather than prospective studies. The latter are obviously much more accurate, but will take a number of years to complete.

The late complications of other countries have also been quoted at length, chiefly those from England.⁷⁻⁹ The English primarily use the D&C method with general anesthesia, largely because of their law requiring a 24-hour hospitalization, which discourages the use of local anesthesia and vacuum aspiration on an "in-and-out" basis. We know that when the abortion is performed under general anesthesia, with the old D&C method, there is usually greater cervical dilatation, increased bleeding, and a higher complication rate. Furthermore, some of the studies that have come out of England have included some second trimester abortions as well as first and have not made a clear-cut distinction between the two. There is obviously a considerable difference in the degree of cervical dilatation which is necessary in the early first trimester with the use of a Karman cannula as compared to the cervical dila-

tation required with a 14-week pregnancy, performed under general anesthesia. These are not comparable procedures and their complications cannot be compared.¹⁰

Tables 1, 2, and 3 show the complications that were incurred during three different months during the past year at Preterm. These months were picked at random after sufficient time had elapsed to obtain an adequate follow-up. By urging patients to make collect phone calls to us on a 24-hour basis, by supplying follow-up forms for both patients and physicians, as well as providing a follow-up clinic, we maintain a patient follow-up of approximately 70%. Table 4 shows the total complications for the three months with the total incidence rate of major and minor complications.

Dr. Tietze⁴ defines major complications as follows:

"Major complications include unintended major

TABLE 1
Number of June 1972 Patients with Post-Abortal Complications, Major Complications by Type, plus Total Minor Complications.

June 1972 (1,269 Patients)	
Complications	Number Of Patients
Perforations: conservative Rx	2
laparotomized	1
Re-evacuation	2
Unsuccessful termination	1
Underestimation pregnancy duration	1
Ectopic pregnancy	2
Total	9
Minor complications	29

TABLE 3
Number of January 1973 Patients with Post-Abortal Complications, Major Complications by Type, plus Total Minor Complications.

January 1973 (1,451 Patients)	
Complications	Number Of Patients
Perforations: conservative Rx	1
laparotomized	0
Re-evacuation	10
Hospitalized for pelvic infection	3
Suicide attempt	1
Underestimation pregnancy duration	1
Hydatidiform mole	1
Total	17
Minor complications	28

TABLE 2
Number of October 1972 Patients with Post-Abortal Complications, Major Complications by Type, plus Total Minor Complications.

October 1972 (1,316 Patients)	
Complications	Number Of Patients
Perforations: conservative Rx	2
laparotomized	0
Re-evacuation	6
Hospitalized for pelvic infection	4
Subsequent surgery	1
Unsuccessful termination	1
Hydatidiform mole	1
Total	15
Minor complications	37

TABLE 4
Total Number of Patients in a Three-Month Study with Major Complications by Type plus Total Major and Minor Complication Rates.

Totals (4,036 Patients)	
Complications	Number Of Patients
Perforations: conservative Rx	5
laparotomized	1
Re-evacuation	18
Hospitalized for pelvic infection	7
Subsequent surgery	1
Unsuccessful termination	2
Suicide attempt	1
Hydatidiform mole	2
Underestimation pregnancy duration	2
Ectopic pregnancy	2
Total	41
	(1%)
Minor complications	94
	(2.3%)

surgery, one or more blood transfusions, three or more days of fever, over one week hospitalization, and other categories associated with comparable degrees of risk of death, prolonged illness or functional impairment." In Tables 1, 2, 3, and 4 all major complications were, of course, listed, as well as any cases that were hospitalized for any reason whatsoever within the immediate post-operative period. The minor complications are chiefly patient's complaints of cramps, mild fever, or bleeding problems, none of which required hospitalization. Loop complications are also included in this category.

June is a rather typical month (Table 1), except for a higher than usual perforation rate. There was a total of three perforations, two of which were treated conservatively, and one of which was laparotomized and the perforation repaired. The only other surgical case occurred in October (Table 2) being listed as "subsequent surgery (salpingectomy)" and is deserving of explanation. This was a patient with a previous history of a tubal pregnancy for which unilateral salpingectomy had been performed. At the time of the vacuum aspiration, the pregnancy was extremely early, tissue was minimal, and the operator could not grossly recognize chorionic villi. The patient was warned regarding the possibility of an ectopic pregnancy in the remaining tube and was told that she would be called regarding the pathologist's report. We learned later that in less than 48 hours, her remaining tube was inadvertently removed by an outside physician, who would not wait for the pathology report which did describe chorionic villi.

Perforation

Fear of uterine perforations haunts every operator. This most serious complication should be suspected: (1) when no tissue is obtained with aspiration, (2) when dilatation has been unusually difficult, (3) when instrument penetration is deeper than size of uterus and (4) when there is sudden, severe pain. This latter diagnostic aid is another advantage of para-cervical block over general anesthesia. Dr. Nathanson has recently pointed out the strong correlation between uterine retroversion and perforation.¹¹ This relationship was corroborated in our three-month study. With a total of six perforations, in four cases the uterus was retroverted.

Immediate treatment consists in starting intravenous fluids to which pitocin may be added,

continual monitoring of the vital signs, frequent checking of the abdomen for signs of intraperitoneal bleeding, and possible transfer to the hospital. It is preferable that the diagnosis be confirmed by another physician. Where there is an question of damage to the bowel, as for example omentum appearing in the cannula, laparotomy should be performed immediately. When perforation is suspected, suction should obviously never be used subsequently because of the danger of the suction tip traumatizing the bowel or mesentery. If evacuation has to be done following a uterine perforation, a curette should be used instead of suction.

In the past 14 months, at Preterm Clinic over 18,000 procedures have been performed. We have had a total of 17 suspected perforations, which makes an incidence of roughly one per 1000 procedures. Two of these were actually pelvic infections diagnosed as possible perforations several days after leaving our care. They were inadvertently explored and no perforations were found. Two other cases were diagnosed during the procedure at Preterm Clinic and were immediately transferred, explored, and repaired. Only four out of the 17 required surgery, which fact probably reflects the early stage of gestation in most of our patients. The fact that almost 50% of our cases are eight weeks LMP or less increases the possibility of treating this complication conservatively.

Re-Evacuation

Re-evacuation is probably the commonest complication of first trimester pregnancy termination and is usually done because of retention of secundines. Herein are grouped most of the complications, characterized by the symptom triad of fever, bleeding, and pain. The number that are hospitalized depends somewhat on the attitude of the doctors giving the follow-up care. It has been apparent that, as the attitude has changed towards abortion procedures and physicians have become more familiar with abortion complications, they are more willing to treat post-abortion complications on an ambulatory basis. The incidence of re-evacuation also reflects the experience of the operator. It has been apparent that the re-evacuation rate increases when new physicians are taken onto the staff.

Most cases of hemorrhage fall into this group. As a rule, very little blood is lost with the vacuum aspiration procedure itself, and the bleeding due

to retained tissue usually does not occur for several days after the procedure. There were three transfusions given to the 4,036 patients treated by us during the three-month period studied. Each of the three patients received two pints of blood, but not until several days after the procedure. Retention of tissue was involved in each of the three cases. At no time in our experience at Preterm has any patient required blood within the first 24 hours after the procedure. This does not mean that a catastrophic hemorrhage could not occur, but after 28,000 procedures with only delayed types of bleeding, it is safe to say that immediate hemorrhage is far from common.

Unsuccessful Termination or Continuing Pregnancy

Into this category fall the cases that were discontinued because of the patient's low threshold for pain, an expression of preference for general anesthesia, difficulty in dilatation of the cervix, and so forth. In most of these instances, the failure is obvious and it is simple to transfer the patient to the hospital where the procedure can be done without difficulty. In the case of difficult cervical dilatation, if the pregnancy is an early one, the patient may be advised to return at a later date, at which time cervical dilatation is usually accomplished with ease. The obvious termination failures are no problem. It is the unsuspected ones that are embarrassing and often tragic. In these situations, pregnancy continues in spite of an apparently normal evacuation, and we are informed of this fact several weeks or months after the initial procedure. Continuing pregnancy has occurred to our knowledge four times in the past 18,000 procedures. In each of the four instances mentioned, a double uterus was excluded. Two patients required a saline induction at 16 weeks, one delivered spontaneously at 16 weeks, and the fourth patient had a vacuum aspiration performed in the hospital at 14 weeks.

This unfortunate complication occurs more frequently in the very early pregnancies, where the small cannulas are used, such as #4 and #5 Karman cannulas. Dr. Stim¹² reports a 5% incidence of missed pregnancies when a #4 Karman cannula was used. He noted a .7% incidence of missed pregnancy with a #5 Karman cannula. Apparently it is possible in early pregnancy to miss the implantation site during aspiration and the pregnancy continues to develop. Therefore, it is extremely important that the tissue be carefully

examined, and sent to the laboratory if chorionic villi cannot be grossly identified, or whenever the tissue is extremely scanty in amount. If there is any question as to the actual termination of pregnancy, the patient should be followed with repeat pregnancy tests, particularly if there is very little or no bleeding following the procedure. It is extremely important that these patients do not become lost to follow-up and pass into a later stage of pregnancy.

Mis-Estimation of Gestational Duration

In spite of competent screeners, and second pelvic examinations by the physician prior to each procedure, occasionally a termination will be begun before the operator realizes that the pregnancy is too far advanced for the vacuum aspiration method. If the uterus sounds beyond 14 cm, the operator should stop and re-evaluate the situation. The pregnancy is either more than 14 weeks, or the uterus is enlarged enough to necessitate being done in another setting. The patient can be moved to the hospital if nothing has been done other than the sounding of the uterus. Active bleeding is rare in this situation. However, bleeding, fever, or labor can ensue shortly thereafter, so it is wise not to delay in transfer of the patient. Another sign that the pregnancy is too far advanced is excessive amniotic fluid. By the time this is noted as it passes through the tubing, the wiser course may be to continue with the procedure. After starting intravenous fluids to which oxytocics should be added, it may be necessary to further dilate the cervix to enable the use of a 14 mm cannula. Fetal parts should be carefully identified to be sure of complete uterine evacuation. It may be necessary to remove fetal parts individually with the intra-uterine dressing or ovum forceps if the tissue is too large in amount to go through the cannula. Obviously, I speak of this situation only to condemn it, and hope none of you will ever be caught in such a predicament. It is up to the judgment of the operator in such a situation to decide whether it is better to transfer the patient immediately or to attempt to complete the procedure at the clinic. Three such transfers have been necessary in the past year.

Ectopic Pregnancies

If no villi or fetal parts are visible in a scanty tissue specimen, and the possibility of perforation is ruled out, the operator should then consider the possibility of an ectopic pregnancy. The tissue must be sent to the laboratory, preferably for a

frozen section, and adnexal masses or tenderness should be noted. The patient is warned of the possibility of an ectopic pregnancy, and she and her physician are notified of the pathologist's report. In very early pregnancy, diagnosis of an ectopic pregnancy may be extremely difficult, and the patient must be followed carefully with pregnancy tests, pelvic examinations, laparoscopy or culdoscopy.

Cervical Lacerations

Cervical laceration is commonly mentioned as a complication of the abortion procedure, but we have had very few. The proper technique and choice of instruments in dilatation of the cervix is probably responsible for our elimination of this troublesome complication. An extremely deep bite is taken with a single-toothed seven-inch Barrett tenaculum through the cervical canal at 12 o'clock, with one prong of the tenaculum actually inside the cervical canal. Dilatation is then carried out using as little force as possible. A more gradual, less forcible dilatation process is possible by using Pratt dilators instead of the well-known Hegar dilators commonly used in hospitals. The Pratt dilator is more tapered at its end and an increased number of instruments in the set allows for a more gradual dilatation process. The use of 20 cc of 1% lidocaine in administering the paracervical block also facilitates dilatation. No great force should be required, and if the ordinary uterine sound cannot be made to enter the cervical canal, a small four or five millimeter flexible cannula is used. If there is any marked abnormality of the cervix, the procedure should be done in the hospital setting.

Summary

Out of a total of 4,036 procedures performed during a three-month period, there was a total significant complication rate of 1% or 41. Minor complications totalled 94, an incidence of 2.3%. There were six perforations out of 4,036, making an incidence of 1.5 per 1000 cases or 0.15%. In the last 18,000 patients we have a total of 17

suspected perforations, which gives a slightly lower incidence of 1 per 1000 (0.10%).

The total number of re-evacuations was 18 in 4,036 procedures, an incidence of 4.5 per 1000 (0.45%). There were an additional seven patients hospitalized with pelvic infections. There were two unsuccessful terminations, one suicide attempt, two hydatidiform moles, two underestimations of duration or gestation, and two ectopic pregnancies.*

Except for one woman who was hospitalized for ten days, none of these patients were hospitalized for more than a week.

Conclusions

Now that, at long last, we have obtained for women the right to a safe and low-cost abortion, what else are we as physicians obligated to do? We must instill social responsibility into our youth by improving their sex education. It must be taught to them that parenthood is an awesome privilege, not necessarily a right. A sexually active woman should feel a responsibility to use an effective method of contraception. Contraceptive services and pregnancy diagnosis should be available to every woman of every age group and the effectiveness of the various contraceptive methods should be well-known.

Abortion is to be condemned as the sole method of contraception, and it should serve only as a necessary back-stop for contraceptive failure. If pregnancy termination is determined necessary, safe, low-cost abortion should be available to any woman of any age in her own locality, and the service should be rendered with dignity and without moral judgment.

The public should *know* that, at the present time, the least expensive, safest, most expeditious site for the delivery of abortion services is the free-standing clinic rather than the hospital or the doctor's office. Contraceptive counseling should be mandatory at the time of the abortion procedure. Women should *know* that the earlier the pregnancy, the safer the termination. Doctors should *know* that local anesthesia with vacuum aspiration is the safest method of termination. By these means, our many problems related to reproduction may be better treated and controlled.

*Since the preparation of this article, an additional ectopic pregnancy as well as another suicide attempt have been reported for the month of January 1973.

References 1-12 will be found on page 842.



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Left Upper Quadrant Pain

R. J. CAMPAIGNE, M.D.,* J. J. COLL, M.D.,* F. L. JOHNSON, M.D.,*
and J. M. STREITZ, M.D.*

A 56-YEAR-OLD WHITE male was admitted to St. Luke's Hospital, Duluth, July 8, 1971, with a two-month history of left upper quadrant pain. The distress was persistent in nature and aggravated by manual labor. There had been no weight loss or change in bowel characteristics and his previous health had been excellent. Symptoms of early obstructive lung disease were presented. The patient complained of pain in the left upper quadrant that was intensified with abdominal palpation and deep inspiration. A mass could not be delineated. Blood pressure examination was 132/86. The remaining portion of the physical examination was within normal limits.

Laboratory studies: Hgb. was 12.5 gm.%, WBC 7,900 with a normal differential. A urinalysis was normal. Sedimentation rate 34 mm/hr. The blood chemistry profile was normal with the exception of an elevation of LDH to 175 units (normal for lab.). Blood gases (O_2 , CO_2 , PCO_2) were normal as was an arterial pH. Pulmonary function studies were compatible with a moderate degree of pulmonary emphysema. A 24-hour urine creatinine level was normal, though the 17 hydroxy and 17 keto steroids were slightly elevated, 14 mgm. and 30.8 mgm. respectively. A dexamethasone suppression study (2 mgm. orally q6h X 8 doses) revealed a complete suppression of the plasma cortisol levels. A urinary catecholamine level was 49 mcg/24 hrs. (within normal limits). Serum electrolyte studies were normal.

A chest Xray was normal. An intravenous pyelogram revealed a downward and outward displacement of the left kidney, confirmed by retrograde pyelogram. A selective arteriogram via the left femoral artery demonstrated a 10 x 15 cm. mass in the region of the left adrenal gland with calcification, (Figure 1) suggestive of adrenal tumor.

Eight days following admission, the patient was taken to surgery where a large encapsulated

adrenal tumor was removed. An incidental splenectomy was also performed to obtain adequate exposure of the tumor. Five units of whole blood were given. The patient made an uneventful recovery and was discharged eleven days post-operatively.

Pathology

Gross description left adrenal gland (Figure 2): This is an encapsulated tumor which weighs 865 grams. It measures 15 by 15 by 10 cm. On the cut section there is a uniform pinkish tan colored tissue recognizable. The center of the lesion is exten-



Fig. 1—Femoral arteriogram demonstrating a mass in the adrenal area.

*Duluth, Minnesota.

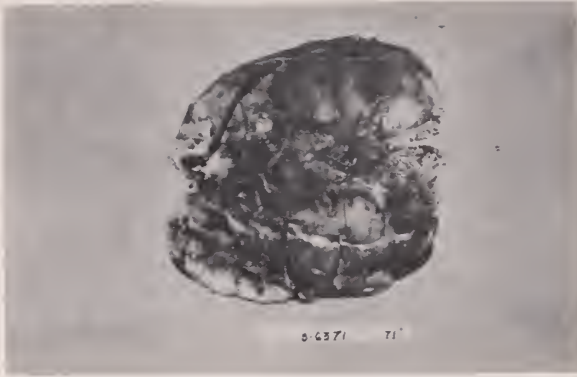


Fig. 2—Pathological specimen.

sively necrotic. The tissue is soft and friable. Representative sections from different areas are taken for microscopic examination.

Microscopic: Selected areas of the grossly observed tumor reveal eosinophilic cells with focal areas of foam cell formation. A moderate variation in size and staining property of the nuclei is seen, and an occasional area of giant cell formation is found. These reveal a prominent variation in size and configuration of the nuclei. Careful search, however, does not show any evidence of vascular invasion of the lesion, and no prominent mitosis. Prominent areas of necrosis are found within the tumor.

Diagnosis: Adrenal cortical tumor, benign.

Discussion

Tumors of the adrenal gland have been classified according to Ackermann as follows:

1. Cortical tumors
 - A. Adenoma
 1. Functioning

2. Nonfunctioning

- B. Adrenocarcinoma

2. Tumors arising from the medulla

- A. Ganglioneuroma

- B. Pheochromocytoma

- C. Neuroblastoma

- D. Mixed variety (ganglioneuroblastoma etc.)

Preoperatively, it was thought the tumor in question was a large nonfunctioning cortical adenoma as substantiated by the laboratory data. There was only a slight elevation of the urinary 17-keto and 17-hydroxy steroids with a dramatic suppression of cortical blood levels with the oral dexamethasone study. The urinary catecholamines were normal, as were plasma electrolyte studies.

Adrenal cortical adenomas are benign encapsulated neoplasms composed principally of cells resembling the adrenal cortex. They are usually single and may reach mammoth size from 1900 grams to 4200 grams. The larger tumors are seen more frequently in the adult, more often on the left. Earlier in life, adenomas are more frequent in females though the difference is not as great in the adult. The functioning adenoma is also more frequent in the younger individual. The overall clinical manifestations depend upon 1. size, position, 2. hormone production, 3. and resultant metabolic disturbances. The larger adenomas may demonstrate malignant change as seen by blood vessel invasion, though the true test of malignant change is the passage of time and the absence of metastasis.

Pseudo-Banti's Syndrome

This term is sometimes used to describe a typical Banti's syndrome that is caused by syphilis. Curschman has reported the case history of a patient who had hepatic cirrhosis, ascites, and esophageal varices.* The patient also had acquired syphilis, which was substantiated by a positive serology. Appropriate antisyphilitic therapy resulted in complete recovery without splenectomy. Curschman emphasizes that a diagnosis of true Banti's syndrome should not be made until the possibility of syphilitic involvement has been excluded; otherwise an unnecessary splenectomy may be done.

Durham, Robert H.—*Encyclopedia of Medical Syndromes*
Hoeber Medical Division, Harper and Row, New York

*Abstract, JAMA 117:1395, 1941.

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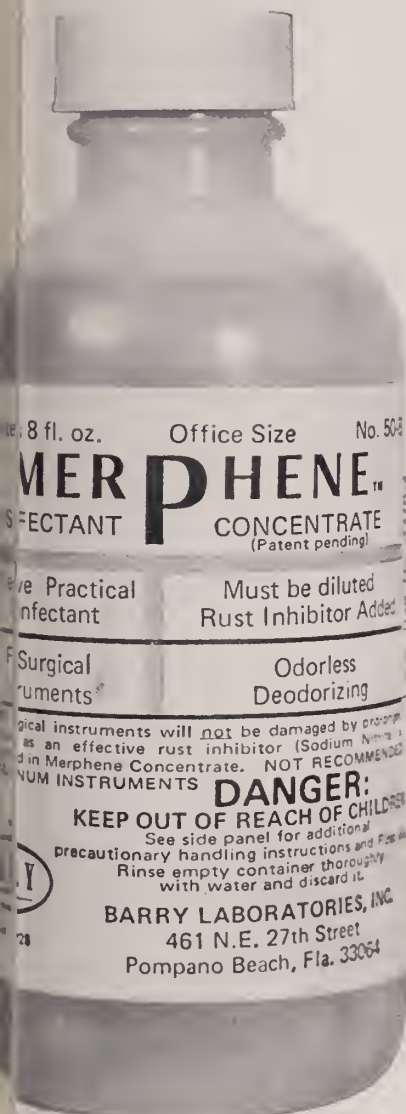
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COUNTRY LIVING-METROPOLITAN CONVENIENCE—WANTED AND NEEDED: One or two General Practitioners to set up practice in new and equipped clinic with utilities paid and rent free 6-12 months. Service area of 9,000 and rapidly growing. New hospital in planning stages, new high school under construction. Located within one hour of Minneapolis-St. Paul. Dental, Veterinary, and Mental Health Clinics also located here. Golfing, bowling, fishing, hunting, etc. in area. Interview expenses and all moving expenses paid. Join us for comfortable country living with big city benefits. Try it, you'll like it! Write: MINNESOTA MEDICINE—485, 375 Jackson, St. Paul 55101.

A BETTER PLACE TO PRACTICE MEDICINE. For those who would prefer to live in a warmer climate, avoid the big city school, traffic and practice problems; contact this multi-specialty group, located in a city of 100,000 people in North Central Texas. Specialists in Internal Medicine, Family Practice, Pediatrics, General and Orthopedic Surgery are needed to complement the current staff of twenty-one full time physicians. Wichita Falls Clinic-Hospital, 1300 Eighth, Wichita Falls, Texas 76301.

WANTED—Recently trained radiologist to provide modern diagnostic and therapeutic radiological services for a recently consolidated midwest regional hospital of approximately 300 beds. Radiologist recently expired and his part time associate plans to retire soon. Write: MINNESOTA MEDICINE—492, 375 Jackson, St. Paul 55101.

FAMILY PHYSICIANS needed in the community of Tracy, Minn. New clinic being built to accommodate 4 doctors in a clinic setting. Excellent opportunity. Contact Administrator, Tracy Municipal Hospital, Tracy, Minnesota 56175, phone 507-629-3200.

PHYSICIANS ASSISTANT—Graduate University Washington MEDEX program. Three years Special Forces medic, one year with GP. Resume upon request. Michael Erkel, Route 2, Box 142, Kimberly, Idaho.

IVERS EDGE MEDICAL CLINIC—Farmington, Mn. needs two additional General Practitioners to practice in a nearly new Clinic, Hospital and Nursing Home. Fast growing area just 45 minutes from St. Paul-Minneapolis. Metropolitan advantage with Community living. Contact M. H. Hunter, M.D. (612) 463-7181.

XPANDING TEN MAN FAMILY PRACTICE GROUP in southern Minnesota. Seeks GENERAL PRACTITIONER OR INTERNIST for summer of 74. New clinic adjacent to a new 114 bed hospital. Fairmont is a progressive community (City of Five Lakes). Starting salary open, early partnership opportunity. Contact D. E. Grandgenett, Fairmont Medical Clinic. 507-238-4263.

WANTED—General Practitioner for an incorporated practice. Wisconsin community of 6,800 on interstate highways. Excellent schools, recreational facilities. Modern clinic adjacent 85 bed hospital. Salary first year then partnership. Call 608-372-4177 Collect.

HELP—us form 3 to 4 man group. 60 bed new hospital. Resident anesthetist, physiotherapist. County seat and industrial town. Modern clinic facilities. Supreme fishing-hunting close by. Artificial ice arena. Municipal pool and golf course. Shared education and vacation time. Good deal! Drs. Delmore and Metcalf, Roseau, Minnesota 56751.

GENERAL PRACTITIONER desired for northern Minnesota clinic located near Lake of the Woods area. Enjoy the clean air, clear waters, compatible working arrangements including ample time off for meetings, vacations and good financial arrangements. Excellently equipped hospital (acute, skilled nursing and board and care facilities.) fine clinic one block from hospital. Write: Minnesota Medicine, 473, 375 Jackson St., St. Paul 55101.

WAYZATA MEDICAL BUILDING OFFICE SUITES—Located in the fastest growing suburban area in the Twin Cities. We offer:

- Surrounding area of lakes, country clubs, woods, beautiful homes;
- Unsurpassed medical building facilities
- Fast growing area—high median family incomes
- Beautiful building—inside and out
- Inner courtyard with trees and landscaping
- Heated indoor parking
- Adjacent access to freeway system
- Low rental fares—favorable lease terms
- Financial services

We have grown to fourteen specialties since our building was completed two years ago. We particularly are interested in General Practice, Orthopedics, Psychiatry, Urology, Otolaryngology and Internal Medicine. Give us a call. We have a lot more to show you and to talk about. Reply to: Mr. Paske, Wayzata Medical Building, 250 North Central Avenue, Wayzata, Minn. 55391, (612) 473-0031.

WANTED—OBSTETRICIAN-GYNECOLOGIST—Seventeen man multi-specialist group, located in the beautiful Hiawatha Valley, 50 miles south of Minneapolis and St. Paul. Seeks Board Certified or eligible OB-GYN to join present two-man department. Full sharing in delivery and major surgery at once. No pregnancy terminations. Send curriculum vitae and brief background sketch, experience, family data, etc. Write: MINNESOTA MEDICINE—488, 375 Jackson St., St. Paul 55101.

Continued on page 909

Recommendations[†] on Combination Live Virus Vaccine

American Academy of Pediatrics

Committee on Infectious Diseases

In the September 15, 1971 AAP Newsletter sent to Academy members, the Committee on Infectious Diseases of the American Academy of Pediatrics stated its recommendations on the use of combination live virus vaccines. After a careful review of available data, the committee concluded that:

- "This information indicates that the products are both safe and effective when used as directed."
- The vaccine "...can, therefore, be recommended with the obvious advantages of reduction in the number of injections for any given child and a concomitant decrease in the required visits to a physician's office or clinic."

[†]For complete text of both recommendations see your MSD representative or write to Professional Service Dept., Merck Sharp & Dohme, West Point, Pa. 19486.

United States Public Health Service

Advisory Committee on Immunization Practices

In the April 24, 1971 issue of *Morbidity and Mortality Weekly Report*, the Advisory Committee on Immunization Practices of the United States Public Health Service presented recommendations on the use of combination live virus vaccine. The committee stated that:

- "Data indicate that antibody response to each component of these combined vaccines is comparable with antibody response to the individual vaccines given separately."
- "There is no evidence that severe reactions to the combined products occur more frequently or are more severe than known reactions to individual vaccines (see pertinent ACIP recommendations)."
- "The obvious convenience of giving already selected antigens in combined form should encourage consideration of using these products when appropriate."



M-M-R^{*}

(MEASLES, MUMPS AND RUBELLA
VIRUS VACCINE, LIVE | MSD)

Single-dose vials

M-M-R, given in a single injection, fits easily into your routine immunization program for well babies. Given at age 12 months, M-M-R provides for vaccination early in life against measles, mumps, and rubella.

MSD suggested immunization schedule for well babies

Age	Vaccine(s)
2 months	DPT (diphtheria-pertussis-tetanus) Oral poliomyelitis vaccine (triple)
3 months	DPT ¹
4 months	DPT Oral poliomyelitis vaccine (triple)
6 months	Oral poliomyelitis vaccine (triple)
12 MONTHS	M-M-R (MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE, MSD)

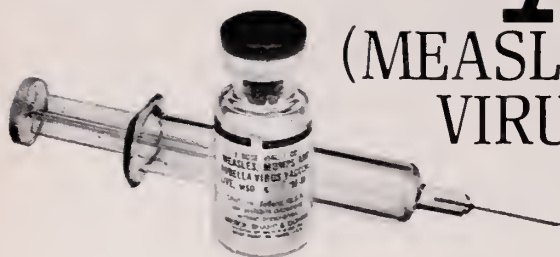
1. This vaccination may be given at 3 months, 5 months, or at 6 months, depending on your preference or on the condition of the child. Since vaccination with a live virus vaccine may depress the results of a tuberculin test for four weeks or longer, the test and the vaccine should not be given during the same office visit.

^{*}Trademark of Merck & Co., Inc.

For a brief summary of prescribing information, please see following page.

M-M-R

(MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE | MSD)



Single-dose vials

No untoward reactions peculiar to the combination vaccine (M-M-R) have been reported.

Moderate fever (101-102.9 F) occurs occasionally. High fever (over 103 F) occurs less commonly. On rare occasions, children who develop fever may exhibit febrile convulsions. Rash (usually minimal and without generalized distribution) may occur infrequently.

Since clinical experience with measles, mumps, and rubella virus vaccines given individually indicates that very rarely encephalitis and other nervous system reactions have occurred, such reactions may also occur with M-M-R. A cause and effect relationship, however,

has not been established.

Excretion of the live attenuated rubella virus from the throat has occurred in the majority of susceptible individuals administered the rubella vaccine. There is no definitive evidence to indicate that such virus is contagious to susceptible persons who are in contact with the vaccinated individuals. Consequently, transmission, while accepted as a theoretical possibility, has not been regarded as a significant risk.

Must not be given to women who are pregnant or who might become pregnant within three months following vaccination.

Contraindications: Pregnancy or possibility of pregnancy within three months following vaccination; infants less than one year old; sensitivity to chicken or duck, chicken or duck eggs or feathers, or neomycin; any febrile respiratory illness or other active febrile infection; active untreated tuberculosis; therapy with ACTH, corticosteroids, irradiation, alkylating agents, or antimetabolites; blood dyscrasias, leukemia, lymphomas of any type, or other malignant neoplasms affecting the bone marrow or lymphatic systems; gamma globulin deficiency, i.e., agammaglobulinemia, hypogammaglobulinemia, and dysgammaglobulinemia.

Precautions: Administer subcutaneously; do not give intravenously. Epinephrine should be available for immediate use should an anaphylactoid reaction occur. Should not be given less than one month before or after immunization with other live virus vaccines; vaccination should be deferred for at least six weeks following blood transfusions or administration of more than 0.02 cc immune serum globulin (human) per pound of body weight, or human plasma.

Due caution should be employed in children with a history of febrile convulsions, cerebral injury, or any other condition in which stress due to fever should be avoided. The physician should be alert to the temperature elevation which may occur after vaccination.

Excretion of the live attenuated rubella virus from the throat has occurred in the majority of susceptible individuals administered the rubella vaccine. There is no definitive evidence to indicate that such virus is contagious to susceptible persons who are in contact with the vaccinated individuals. Consequently, transmission, while accepted as a theoretical possibility, has not been regarded as a significant risk.

Attenuated live virus measles and mumps vaccines, given separately, may temporarily depress tuberculin skin sensitivity; therefore, if a tuberculin test is to be done, it should be scheduled before vaccination, to avoid the possibility of a false negative response.

Before reconstitution, refrigerate vaccine at 2-8 C (35.6-46.4 F) and protect from light. Use only diluent supplied to reconstitute vaccine. If not used immediately, return reconstituted vaccine to refrigerator at 2-8 C (35.6-46.4 F), and discard after eight hours.

Adverse Reactions: Fever, rash; mild local reaction such as erythema, induration, tenderness, region lymphadenopathy; parotitis; thrombocytopenia and purpura; allergic reactions such as urticaria; arthritis arthralgia, and polyneuritis.

Occasionally, moderate fever (101-102.9 F); less commonly, high fever (above 103 F); rarely, febrile convulsions.

Encephalitis and other nervous system reactions that have occurred very rarely with the individual vaccine may also occur with the combined vaccine.

Transient arthritis, arthralgia, and polyneuritis are features of natural rubella and vary in frequency and severity with age and sex, being greatest in adult females and least in prepubertal children. Such reactions have been reported with live attenuated rubella virus vaccines. Symptoms relating to joints (pain, swelling, stiffness, etc.) and to peripheral nerves (pain, numbness, tingling, etc.) occurring within approximately two months after immunization should be considered as possibly vaccine related. Symptoms have generally been mild and of no more than three days duration. The incidence in prepubertal children would appear to be less than 1% for reactions that would interfere with normal activity or necessitate medical attention.

How Supplied: Single-dose vials of lyophilized vaccine, containing when reconstituted not less than 1,000 TCID₅₀ (tissue culture infectious doses) of measles virus vaccine, live, attenuated, 5,000 TCID₅₀ of mumps virus vaccine, live, and 1,000 TCID₅₀ of rubella virus vaccine, live, expressed in terms of the assigned titer of the NIH Reference Measles, Mumps, and Rubella Viruses, and approximately 25 mcg neomycin with a disposable syringe containing diluent and fitted with a 25-gauge, 5/8" needle. Also in boxes of 10 single dose vials nested in a pop-out tray with a separate box of 10 diluent-containing syringes.

For more detailed information, consult your MSD representative or see full prescribing information. Merck Sharp & Dohme, Division of Merck & Co., INC., West Point, Pa. 19486

MSD
MERCK
SHARP &
DOHME

Laboratory Letter

Why the Protein—Bound Iodine (PBI) Test is Becoming Obsolete

The PBI is becoming an obsolete test because of increasing environmental iodine. As documented in this *Letter*, iodine use is now so widespread that half of the high PBIs our laboratory now measures is elevated because of iodine contamination.

It is easy for you to detect grossly contaminated PBIs. But slight iodine contamination is more subtle. The PBI may be just enough to lift the value from the hypothyroid to euthyroid range or from euthyroid to hyperthyroid levels. Just enough, in other words, to deceive you.

Questions and Answers

What are the odds your patient will have a high PBI?

We don't know for sure, but of all the PBIs our laboratory receives about 20 of 100 are elevated.

And what are the chances these elevated PBIs will be contaminated by iodine?

About half of the high PBIs will be contaminated, i.e., the patient has been exposed to enough iodine to elevate the PBI.

Study

I arrived at these figures after studying 100 consecutive patients on whom physicians had ordered a PBI, T-3, and T-4 (Murphy-Pattee).

Twenty of the patients had a high PBI.

After considering the relationships between PBI, T-3, T-4, and thyroid indices (PBI X T-3) and (T-4 X T-3), I concluded:

- 1) Five of the 20 high PBIs were due to hyperthyroidism;
- 2) Five of the 20 high PBIs were secondary to hormones (pregnancy, estrogens, the pill, or other steroids);
- 3) Five of the 20 high PBIs were the result of gross contamination, i.e., the PBIs exceeded 20 mcg.%; and
- 4) Five of the 20 high PBIs were only moderately contaminated, i.e., between eight and 20 mcg.%

PBI and The Rule of Fourths

From these figures from our practice, I have evolved a Rule of Fourths for why a PBI may be elevated:

A *Fourth* of the time, the PBI is high because of hyperthyroidism.

A *Fourth* of the time, the PBI is high because of hormonal factors.

A *Fourth* of the time, the PBI is high because of gross iodine contamination.

A *Fourth* of the time, the PBI is high because of slight iodine contamination.

Why?

Why is iodine contamination so frequent?

Probably because iodine is used to make more products and to do more things that involve more of the people more of the time.

Some examples:

1. *Staples—Food, Bread, and Water*

Did you know agents used to dye foods red contain iodine? Or that Kaboom Oat Cereal has a high iodine content? Were you aware that calcium iodate is used to make ordinary white bread? Or that antibacterial iodine compounds

are employed to purify city water supplies and swimming pool water?

Red-dyed foods, including	Vought, R.L., et al.: Erythrosine: an Adventitious Source of Iodide, <i>J. Clin. Endocrinol. Metab.</i> , 10:747-752, 1972.
Kaboom Oat Cereal	
White Bread	Pittman, J.A., Jr. et al.: Changing Normal Ranges for Thyroidal Radioiodine Intake, <i>N Engl J. Med.</i> , 280:1431-1434, 1969.
Water Supplies	Freund, G. et al.: Effect of Iodinated Water Supplies on Thyroid Function, <i>J. Clin. Endocrinol. Metab.</i> , 6:619-624, 1966.

2. *Drugs—Under and Over the Counter*

Has it come to your attention that iodine contaminates cosmetics, dandruff, medications, antidiarrheal drugs, expectorant mixtures, gargles, suntan lotions, cough medicines, vitamins, Metracal, antiseptic solutions, toothpastes, and vaginal suppositories?

Or have your information sources told you that the FDA has approved Erythrosine—a red dye that accounts for the pink and red hues of these capsules: lithium carbonate, Darvon and Natalins?

Cosmetics	Becker, D.V. and Hurley, O.R.: The Impact of Technology on Clinical Practice in Grave's Disease, <i>Mayo Clin. Pro.</i> , 47:835-847, 1972.
Dandruffs, Cough Mixtures, Gargles, Mouth Washes, and Expectorants	Garb, S.: Clinical Guide to Undesirable Drug Interactions and Interferences, Springer Publishing Co., New York, 1971.
Antidiarrheal Drugs	Ackland, J.D.: Interpretation of Serum Protein Bound Iodine: A Review, <i>J. Clin. Path.</i> , 24:187, 1971
Suntan Lotions	Martin, E.W., Hazards of Medication, Lippincott, Philadelphia, 1971.

3. *Hospital—Radio-opaque Contrast Media and Antiseptic Solutions*

As you undoubtedly know, most contrast media contain iodine (Table 1). And the effects of these media on the PBI usually lasts from months to years. Since the hospital use of iodine-containing contrast media is doubling every five years, this source of PBI contamination is likely to increase. So will the use of iodine-containing antiseptic solutions. As physicians operate more, insert more catheters and tubes, and use more instruments in more body crevices and crannies, more antiseptic solutions will be needed.

Iodipamide (Cholografin®)	4 months	Propylidone (Dionosil®)	up to 5 months
Iodopyracet (Diodrast®)	2 weeks	Acetrizate (Urokon®)	1 month
Diatrizoate (Hypaque®)	1 week	Iophenoxic acid (Teridax®)	many years
Iodized oil (Lipiodol®)	over 5 years	Iodoaliphonic acid (Priodax®)	3 to 4 months
Iophendylate (Pantopaque®)	6 months	Bunamiodyl (Orabilex®)	1 to 2 months
Iopanoic acid (Telepaque®)	5 months	Iodipamide (Biligradin®)	1 month

Table 1—Some Common Contrast Media That Contaminate the PBI. Duration of Contamination is Listed.

4. *Others and More.*

Finally, for completeness, on the next two pages are more sources of iodine contamination. I have unearthed these sources by digging through the literature.

In conclusion, because of widespread and insidious iodine contamination, the PBI will soon become an obsolete test.

Name	Comment	Reference	Name	Comment	Reference
Adipiodone	Contains iodine	1	Iodipamide	Lasts 3-4 months	9
Albumin, Serum	Some albumin preparations are iodinated	2	Cholografin, iodipamide, Meglumine, Sodium Iodipamide, Biligrafin, Radio-selectran		
Antiseptics	If they contain iodine and are used to clean skin	3	Iodoalphonic Acid	Lasts 2-12 months	10
Ethanol, isopropanol			Priodax		
Hydrochlorites, Iodine Compounds, Mercury Compounds, Silver Compounds			Iodocasein	Organic iodine contamination	5
Barium Salts	Occasionally contaminated with organic iodine	3	Iodochlorhydroxyquin, Iodochlorhydroxyquinoline, Clioquinol, Vioform	Contains iodine, effect lasts 2-3 months	11
Barium Sulfate, Erythrotrast			Iodoform	Contains iodine	1
Benziodazone	Contains 36% iodine	4	Iodopyracet	Contains iodine, effect last two weeks	12
Cardivix			Diodrast, Pylumbrine, Pyelobrine, Diodone, Periodil, Pyelosil, Urograf, Vasidone		
Bismuth Salts	Many contain iodine	4	Iodothiouracil	Contains organic iodine, effects lasts 1-4 months	2
Bromides	May be contaminated with iodine	5	5-Iodothiouracil, Itrumul, Iorothiouracil		
Neurosine, Bromide Salts			Iopanoic Acid	Contains organic iodine, effect lasts 1-4 months	9
Bromfulfalein (BSP)	Organic iodide contaminates some solutions	6	Telepaque, Chola-dine, Cistocel, Colepax, Felombrine, Iodopamoic Acid, Teletrast		
Sulfobromophthalein			Iophenoxic Acid	Contains iodide, effect lasts up to 30 years	8
Chinifon	Contains 27.5% iodine	4	Teridax, Trilobrine, Triloshade		
Quinoxyl, Yatren			Iophendylate	Contains iodine, effect lasts up to 5 years	8
Clioquinol	Iodine contamination in some preparations	1	Pantopaque	Contains iodine	1
Chiniform, Chloriodohydroxyquinole, Enteroquinole, Entrine, Enteroseptal, Entero-vioform			Iopydone	Contains iodine	8
Cough Medications	Some contain iodines	5	Iloquine	Contains iodine	1
Dandruff Medications	Some contain iodine	5	Iothalmate	Contains iodine	1
Iloquin, Selenium Sulfide, Cadmium Sulfide			Iothalmate Meglumide Conray, Angio-Conray, Conray-400, Sodium Iothalmate, Iothal-mic Acid		
Decamethonium	Contains 49.5% iodine	5	Iodate	Contains organic iodine	10
Decamethonium iodide, Syecurine, Eulissin			Iodate Calcium, Iodate Sodium, Orografin, Solu-bilopten		
Dextrothyroxine	Contains 65% iodine. May increase PBI to 10-25 meg %. Patients should be followed with T-4	4	Isopropamide	Contains iodine	4
Sodium dextrothyroxine, Dethyrene, Choloxin			Isopropamide Iodide, Tyrimide, Priamide, Darbid, Ornade, Tuss-Ornade		
Diodocaffeine	Contains 66.5% iodine	4	Lipiodal	Contains iodine, effect lasts 1-5 years	9
Diiodocaffeine hydroiodine, Iodocaffeine, Caffedrine			Iodizedoil, Visciodal	Contains iodine and iodide, effect lasts three weeks	9
Diodo hydroxyquin	Contains 65% iodine, effect lasts few weeks		Lugol's Iodine		
Diodoquin, Moebiquin, Yodoxin, Floraquin			Meprobamate	Contains iodine	2
Diodoquinoline	Contains 67% iodine	4	Equanil, Miltown, Arcoban, Mepro-mon CMC, Vioba-mate		
Amoebindoy, Amoequin			Methiodal	Contains iodine, effect lasts 1-2 weeks	9
Diprotazoate	Contains iodine	9	Methiodal Sodium, Skiodam, Retro-paque		
Sodium, Diprotazoate, Miokin			Metracal	Probably due to Iodo-casein content. Lasts 30 days	13
Dimethyltubocuran	Contains 35% iodine	4	Mouth Washes	Some contain iodine	5
Dithiazine	Contains 24.5% iodine	4	Neo-Lopax	Contains iodine, effect lasts 1-2 weeks	8
Dithiazine iodine, Delvex, Partel, Telmid, Anelmid			Penethamate	If given as hydroiodine salt	1
Ethiodal	Contains iodine	7	Penethamate Hydroiodine, Cerespan, Pavabid, Vasopan, Blupau		
Ethiodized oil			Peraphenazine	May contain iodinated contaminants	14
Floraquine	Contains iodine, effect lasts 2-4 weeks	8	Trilafon	Contains iodine	1
Gallamine	Organic iodine contamination	1	Pheniodal		
Gargles	Some contain organic or inorganic iodine	5			
Hippuran	Contain iodine	9			
Sodium Iodohippurate					
Hydroxyquinoline	Present in vaginal suppositories (often iodinated)	2			
Iodocyanine green	Organic iodine contamination	5			
Cardio-green	Effect lasts up to two days	8			
Iodinated Glycerin					

LABORATORY LETTER

Name	Comment	Reference	Name	Comment	Reference
Pink Capsules	Used to encase many drugs. May contain iodine in dye.	5	Tetraiodofluoresce	Red dye used to color many	4
Potassium Iodide	Small doses don't elevate out of normal range, but large ones do.	3	Tetridaz-B	Iodine contamination	5
Mudrane, Pima			Toothpaste	Many contain enough iodine to elevate 1-2 meg%	3
Synate-Mithiokin			Vitamin A & Vitamin D	When given in Cod Liver Oil	16
Propyl iodane	Contains iodine; effect lasts 1-5 months	2	Vitamin Preparations	Iodine contamination	5
Dionsil					
Quinine Iodobis	Contains 57% iodine	4			
Quinine Iodo-histhimate, Bio-iodichinal, Bismo-salvan					
Red-dyed drugs as foods	Presence of Erythrocrine Dye	15			
Suntan oil	Many preparations contain iodine	16			

Richard L. Reece, M.D.
Minneapolis, Minnesota

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7. AMA Council on Drugs, AMA Drug Evaluations, 535 North Dearborn Street, Chicago, Illinois.
8. Bio Science Handbook, Specialized Diagnostic Tests, 9th Edition, 1971.
9. Schwartz, M K: Interferences in biochemical tests. *Mem Sloan-Kettering Clin Bull*, 1:11, 1971.
10. Henry R J: Clinical chemistry: principles and techniques. Hoeber Division, Harper and Row, New York, N.Y., 1964.
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12. Meyers F H, Jawetz E, and Goldfien A: Review of medical pharmacology. Lange, Los Altos, California, 1968.
13. Steinberg M and Leifheit H C: Effect of metracal on serum-precipitable iodine values. *Texas Rep Biol Med*, 23:122, 1965.
14. Hansen J M, Siersboeck-Nielsen K: Serum protein-bound iodine and serum thyroxine during perphenazine therapy. *Acta Endocrinol*, 55:136, 1967.
15. Andersen C J, Keiding N R, and Neilsen A B: False elevation of serum protein-bound-iodine caused by red colored drugs or foods. *Scand J Clin Lab Invest*, 6:249, 1964.
16. Martin E W: Hazards of medication. Lippincott, Philadelphia, 1971.

Meetings

OB-Gyn Symposium

On Friday, November 30, 1973, in Minneapolis, Minnesota, the Sixth Annual North Memorial Hospital OB-Gyn Symposium will be held. Selected speakers will discuss current topics of interest in our field. The Symposium will be followed the next day by the annual meeting of the Minnesota State Obstetrics and Gynecological Society. Inquiries should be directed to Alec Janes, MD, Program Chairman, 601 Oakdale Medical Center, Mpls. (55422).

University of Iowa

The fourth Annual Meeting on *Antibiotics and Infection* will be held at the University of Iowa on Thursday, Friday, and Saturday, October 11th, 12th, and 13th. As well as 30 speakers from the University of Iowa Faculty, there will be six guest speakers: Dr. Saul Krugman of New York University; Dr. Gerald L. Mandell of University of Virginia Medical School; Dr. Sergio Rabinovich of the University of Southern Illinois; Dr. Jack S. Remington of Stanford University School of Medicine; Dr. John A. Washington II of the Mayo Clinic Medical School, and Dr. Arthur C. White of Indiana University School of Medicine. Inquiries should be made to Dr. Ian M. Smith, Department of Internal Medicine, University Hospitals, Iowa City, Iowa 52242.

Classified Advertisements

Continued from page 901

TROUT BROOK much admired St. Croix Valley estate. Charming 4 Bdrm main house and separate guest house. Sheltered by mature maple trees. Private trout brook rises on property. 28 to 100 acres. Onstad Realty, Stillwater 439-2997.

INTERNIST, university trained, subspecialty, age 42, private solo practice experience, desires clinic association or partnership. Write: MINNESOTA MEDICINE-493, 375 Jackson St., St. Paul 55101.

NON-PROFIT NEIGHBORHOOD clinic currently dealing in VD, pregnancy and family planning services requires full-or-part-time medical director by January, 1974. Approved as conscientious objector alternate service. Stipend and benefits open. Contact Jane Berg, Clinic Director, The Family Tree, 1599 Selby, St. Paul 55104, (612) 645-0478.

GENERAL PRACTITIONER urgently needed to help carry the load in a busy four man clinic. New clinic building. Hospital across the street. Very attractive duty hours. In the clean air country of northern Minnesota. Call or write to Fred Martin, M.D., Clearwater Clinic, Bagley, Minn. Ph 218-694-6281.

INTERNIST—Fully trained doing advanced study desires part time employment. Weekend or night practice coverage or ER work in Twin Cities or SE Minnesota. Consider locum tenens in October-November entire state. Write: MINNESOTA MEDICINE-494, 375 Jackson St., St. Paul, Mn. 55101.

F.P. TO TAKE over busy practice by Nov. 1973 on beautiful Lake Minnewaska with all summer and winter sports. Wonderful place to raise family in progressive county seat comm. of over 3000. 40 bed accredited hospital with 4 man clinic being const. this fall. Step into ready-made practice. Only investment office equipment. Lovely lake home also available. Write Box 158, Glenwood, Minn. or call collect 612-634-4514.

FULL TIME F.P. urgently needed; small town living; Xlnt. consultations avail.; opport. for continuing education; accred. hosp.; 1 nite per week plus every fourth weekend. Call Oliver E. H. Larson, M.D., 118 E. 4th St., Zumbrota, Minn. 55992, (507) 732-5119.

INTERNIST-FAMILY PRACTITIONER to join three Family Practitioners and one Board Certified Surgeon in Incorporated group practice. Only 60 minutes north of the Minneapolis-St. Paul area with easy access to lakes and outdoor sports. Facilities include New Clinic, 63 bed general hospital with ICCU and 87 bed nursing home, all new. Call or write: Larry J. Brettingen, M.D., 224 7th St., Mora, Minnesota 55051, Ph. (612) 679-1313.

WANTED—One or two F.P. or G.P. for practice in Pine Island, Minnesota. New two-man medical building. Available immediately. Choice of solo or associate practice. Contact: Gerald Regan or James Bale, Tel: 507-356-4529 and 507-356-8343.

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Drowsiness, fatigue and ataxia have been the most commonly reported side effects.

Until response is determined, patients receiving Valium should be cautioned against engaging in hazardous occupations requiring complete mental alertness, such as driving or operating machinery.

Before prescribing, please consult complete product information, a summary of which follows:

Indications: Tension and anxiety states; somatic complaints which are concomitants of emotional factors; psychoneurotic states manifested by tension, anxiety, apprehension, fatigue, depressive symptoms or agitation; symptomatic relief of acute agitation, tremor, delirium tremens and hallucinosis due to acute alcohol withdrawal; adjunctively in skeletal muscle spasm due to reflex spasm to local pathology, spasticity caused by upper motor neuron disorders, athetosis, stiff-man syndrome, convulsive disorders (not for sole therapy).

Contraindicated: Known hypersensitivity to the drug. Children under 6 months of age. Acute narrow angle glaucoma; may be used in patients with open angle glaucoma who are receiving appropriate therapy.

Warnings: Not of value in psychotic patients. Caution against hazardous occupations requiring complete mental alertness. When used adjunctively in convulsive disorders, possibility of increase in frequency and/or severity of grand mal seizures may require increased dosage of standard anticonvulsant medication; abrupt withdrawal may be associated with temporary increase in frequency and/or severity of seizures. Advise against simultaneous ingestion of alcohol and other CNS depressants. Withdrawal symptoms (similar to those with barbiturates and alcohol) have occurred following abrupt discontinuance (convulsions, tremor, abdominal and muscle cramps, vomiting and sweating). Keep addiction-prone individuals under careful surveillance because of their predisposition to habituation and dependence. In pregnancy, lactation or women of childbearing age, weigh potential benefit against possible hazard.

Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

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Indications: Acute gouty arthritis, rheumatoid arthritis, rheumatoid spondylitis.

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Warnings: Age, weight, dosage, duration of therapy, existence of concomitant diseases, and concurrent potent chemotherapy affect incidence of toxic reactions. Carefully instruct and observe the individual patient, especially the aging (forty years and over) who have increased susceptibility to the toxicity of the drug. Use lowest effective dosage. Weigh potentially unpredictable benefits against po-

tential risk of severe, even fatal, reactions. The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias, including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonamides, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

Precautions: The following should be accomplished at regular intervals: Careful detailed history for disease being treated and detection of earliest signs of adverse reactions; complete physical examination including check of patient's weight; complete weekly (especially for the aging) or an every two week blood check; pertinent laboratory studies. Caution patients about participating in activity requiring alertness and coordination, as driving a car, etc. Cases of leukemia have been reported in patients with a history of short- and long-term therapy. The majority of these patients were over forty. Remember that arthritic-type pains can be the presenting symptom of leukemia.

Adverse Reactions: This is a potent drug; its misuse can lead to serious results. Review detailed information before beginning therapy. Ulcerative esophagitis, acute and reactivated gastric and duodenal ulcer with perforation and hemorrhage, ulceration and perforation of large bowel, occult G.I. bleeding with anemia,

gastritis, epigastric pain, hematemesis, dyspepsia, nausea, vomiting and diarrhea, abdominal distention, agranulocytosis, aplastic anemia, hemolytic anemia, anemia due to blood loss including occult G.I. bleeding, thrombocytopenia, pancytopenia, leukemia, leukopenia, bone marrow depression, sodium and chloride retention, water retention and edema, plasma dilution, respiratory alkalosis, metabolic acidosis, fatal and nonfatal hepatitis (cholestasis may or may not be prominent), petechiae, purpura without thrombocytopenia, toxic pruritus, erythema nodosum, erythema multiforme, Stevens-Johnson syndrome, Lyell's syndrome (toxic necrotizing epidermolysis), exfoliative dermatitis, serum sickness, hypersensitivity angitis (polyarteritis), anaphylactic shock, urticaria, arthralgia, fever, rashes (all allergic reactions require prompt and permanent withdrawal of the drug), proteinuria, hematuria, oliguria, anuria, renal failure with azotemia, glomerulonephritis, acute tubular necrosis, nephrotic syndrome, bilateral renal cortical necrosis, renal stones, ureteral obstruction with uric acid crystals due to uricosuric action of drug, impaired renal function, cardiac decompensation, hypertension, pericarditis, diffuse interstitial myocarditis with muscle necrosis, perivascular granulomata, aggravation of temporal arteritis in patients with polymyalgia rheumatica, optic neuritis, blurred vision, retinal hemorrhage, toxic amblyopia, retinal detachment, hearing loss, hyperglycemia, thyroid hyperplasia, toxic goiter, association of hyperthyroidism and hypothyroidism (causal relationship not established), agitation, confusional states, lethargy; CNS reactions associated with overdosage, including convulsions, euphoria, psychosis, depression, headaches, hallucinations, giddiness, vertigo, coma, hyperventilation, insomnia; ulcerative stomatitis, salivary gland enlargement. (B)98-146-800-F (10/71)

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Contraindications: Known hypersensitivity to flurazepam HCl.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. Caution against hazardous occupations requiring complete mental alertness (e.g., operating machinery, driving). Use in women who are or may become pregnant only when potential benefits have been weighed against possible hazards. Not recommended for use in persons under 15 years of age. Though physical and psychological dependence have not been reported on recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage.

Precautions: In elderly and debilitated, initial dosage should be limited to 15 mg to preclude oversedation, dizziness and/or ataxia. If combined with other drugs having hypnotic or CNS-depressant effects, consider potential additive effects. Employ usual precautions in patients who are severely depressed, or with latent depression or suicidal tendencies. Periodic blood counts and liver and kidney function tests are advised during repeated therapy. Observe usual precautions in presence of impaired renal or hepatic function.

Adverse Reactions: Dizziness, drowsiness, lightheadedness, staggering, ataxia and falling have occurred, particularly in elderly or debilitated patients. Severe sedation, lethargy, disorientation and coma, probably indicative of drug intolerance or overdose, have been reported. Also reported were headache, heartburn, upset stomach, nausea, vomiting, diarrhea, constipation, GI pain, nervousness, talkativeness, apprehension, irritability, weakness, palpitations, chest pains, body and joint pains and GU complaints. There have also been rare occurrences of sweating, flushes, difficulty in focusing, blurred vision, burning eyes, faintness, hypotension, shortness of breath, pruritus, skin rash, dry mouth, bitter taste, excessive salivation, anorexia, euphoria, depression, slurred speech, confusion, restlessness, hallucinations, and elevated SGOT, SGPT, total and direct bilirubins and alkaline phosphatase. Paradoxical reactions, e.g., excitement, stimulation and hyperactivity, have also been reported in rare instances.

Dosage: Individualize for maximum beneficial effect. *Adults:* 30 mg usual dosage; 15 mg may suffice in some patients. *Elderly or debilitated patients:* 15 mg initially until response is determined.

Supplied: Capsules containing 15 mg or 30 mg flurazepam HCl.



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It's time for action to defend the laws and regulations that protect your patients against drug substitution.

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The Executive Committee of the National Association of Retail Druggists

The Board of Directors of the Pharmaceutical Manufacturers Association

The National Wholesale Druggists' Association



Statement on Antisubstitution Laws and Regulations

The purpose of this statement is to affirm the support of the participating organizations for the laws, regulations and professional traditions which prohibit the unauthorized substitution of drug products.

Traditionally, physicians, dentists and pharmacists have worked cooperatively to serve the best interests of patients. Productive cooperation has been achieved through mutual respect as well as a common concern for the ideals of public service. This mutual respect has been evidenced, in part, by joint support over the years for the adoption and enforcement of laws and regulations which prohibit unauthorized substitution and encourage joint decision and selection of the best drug supply of drug products. Basic principles of medical, dental and pharmacy practice are thus maintained and preserved in the interest of patient welfare.

The antisubstitution laws have obstructed enhancement of the professional status of pharmacy any more than they have in and of themselves guaranteed absolute protection from unsafe drugs, or freed physicians, dentists and pharmacists from their responsibilities to patients. In fact, on the practical matter, however, such laws and regulations encourage interprofessional communications regarding drug product selection and assure each profession the opportunity to use fully its expertise in drug selection to the advantage of patients.

Physicians and dentists should be encouraged to increase the frequency and regularity of their contacts with pharmacists in selection of quality drug products, recognizing that

economies to patients can be improved through such communication, taking into account the patients' needs. The pharmacist's knowledge of the chemical characteristics of drugs, their mode of action, toxic properties and other characteristics that assist in making drug selection decisions should be utilized to the fullest extent practicable by physicians and dentists in serving their patients.

Since drug product selection entails knowledge derived from clinical experience, the physician's and dentist's roles in product selection remain primary and do not permit delegation of decisions requiring medical and dental judgments. A broader role in therapy will evolve for pharmacists as improved understanding and cooperation among the professions continue to grow.

There has been no evidence that there are convincing reasons to modify or repeal existing laws and regulations prohibiting the unauthorized substitution of another drug product for the one specified by a prescriber. It is our belief that such laws and regulations merit the joint support of the medical, dental and pharmaceutical professions and the pharmaceutical industry.

Add your opinion to the weight of other professionals and send it to your state assemblyman or legislator.

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ROCHE announces new

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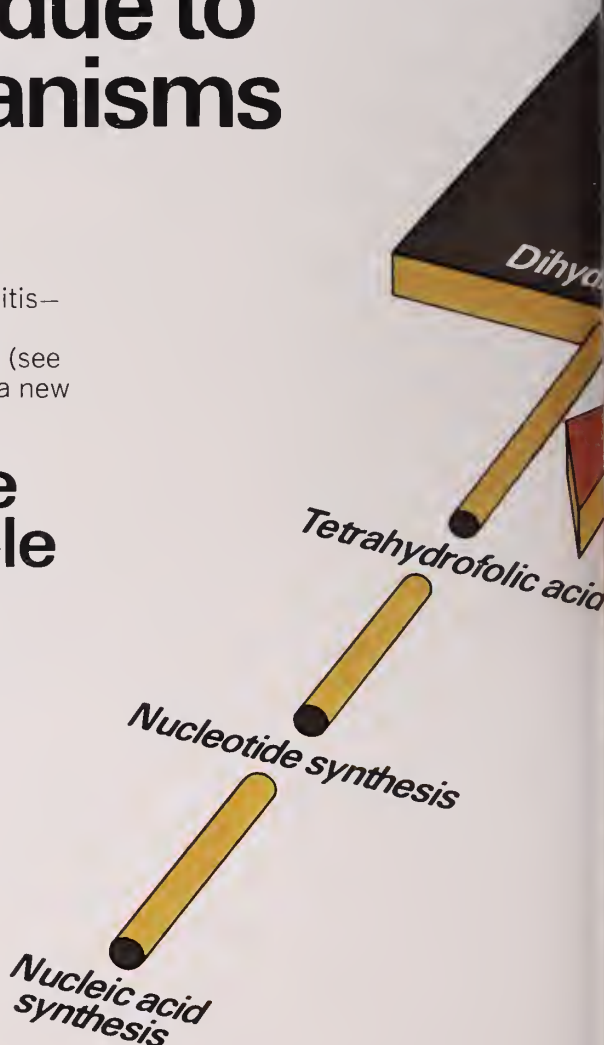
Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

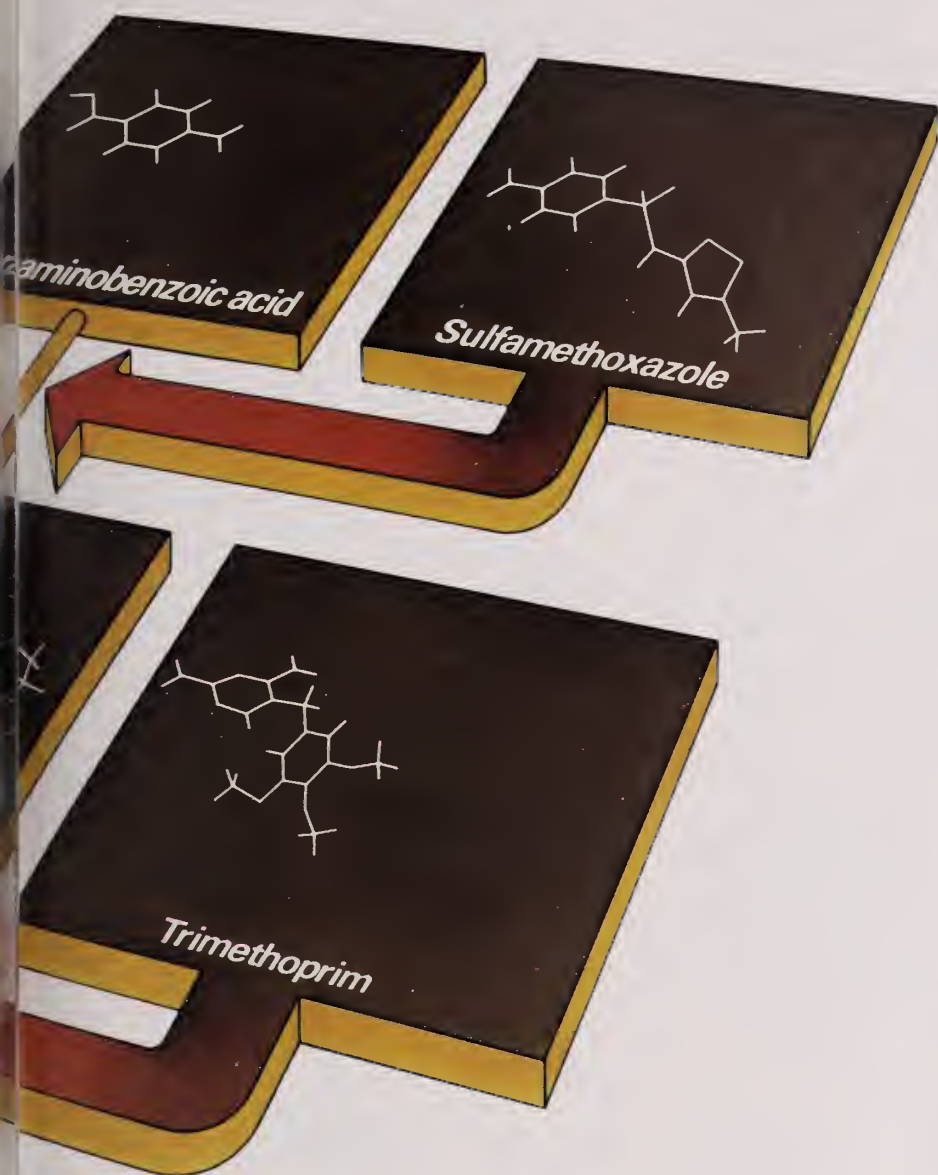
a new type of antibacterial for a two-pronged attack against chronic urinary tract infections due to susceptible organisms

Bactrim is highly effective in the treatment of these infections—primarily pyelonephritis, pyelitis and cystitis—when due to susceptible organisms. This efficacy is related to the unique mode of action against bacteria (see illustration), an action that, in effect, makes Bactrim a new type of antibacterial.

Bactrim interrupts the life cycle of susceptible bacteria

Unique mode of action interrupts the life cycle at two important points, thereby impeding the production of nucleic acids and proteins essential to these bacteria. These consecutive interruptions occur because sulfamethoxazole and trimethoprim resemble naturally existing substrates. By competitive replacement of these substrates, they inhibit further synthesis.





new **BACTRIM**TM

Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

for chronic urinary tract infections

Before prescribing, please see complete product information on last page of advertisement.

Excellent clinical response in chronic urinary tract infections even with obstructive complications

A multiclinic, double-blind study* of response to a ten-day course of therapy in 471[†] patients with chronic urinary tract infections demonstrated the superiority of Bactrim. On the 10th day after initiation of therapy, 91.7% (of 168 patients) showed significant bacteriological response to Bactrim, compared with 81.2% (of 144 patients) to trimethoprim and 64.5% (of 155 patients) to sulfamethoxazole. More than half of these patients had obstructive complications.

Excellent response maintained

Bactrim proved equally impressive in maintaining this bacteriological response. In the above study, after a ten-day course of therapy with Bactrim, 68.4% of patients with chronic urinary tract infections *maintained* response for up to 42 consecutive days, compared with 59.7% with trimethoprim and 44.4% with sulfamethoxazole. These results are particularly noteworthy considering the number of patients with obstructive complications—cases regarded as being notoriously difficult to treat.

Prescribing considerations

Clinical Limitations: Currently, the increasing frequency of resistant organisms is a limitation of usefulness of all antibacterial agents, especially in the treatment of chronic and recurrent urinary tract infections. Not recommended for children under twelve.

Contraindications: Hypersensitivity to trimethoprim or sulfonamides. Pregnancy and during the nursing period.

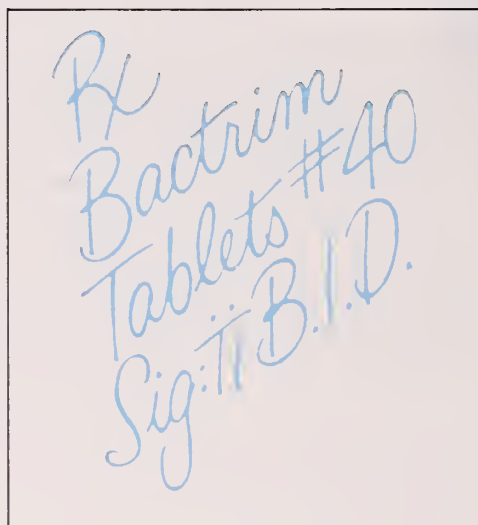
Warnings and Precautions: Both sulfamethoxazole and trimethoprim have been reported to interfere with hematopoiesis. Complete blood counts should be done frequently. If a significant reduction in the count of any formed blood element is noted, Bactrim should be discontinued. Bactrim should be given with caution to patients with impaired renal or hepatic function, possible folate deficiency, severe allergy or bronchial asthma. Maintain adequate fluid intake. Urinalyses with careful microscopic examination and renal function tests should be performed during therapy, particularly for those patients with impaired renal function.

Adverse Effects: Among the most common side effects are nausea, vomiting, rash, leukopenia and elevations in SGOT and creatinine.

Usual adult dosage: two tablets every twelve hours for 10 to 14 days; no loading dose required.

*Data on file, Hoffmann-La Roche Inc., Nutley, N.J. 07110

[†]4 patients not available for evaluation at day 10.



new BACTRIMTM

Each tablet contains 80 mg trimethoprim and 400 mg sulfamethoxazole.

for chronic urinary tract infections



Roche Laboratories
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Before prescribing, please consult complete product information on facing page.

Complete Product Information:

Description: Bactrim is a synthetic antibacterial combination product, available in scored light-green tablets, each containing 80 mg trimethoprim and 400 mg sulfamethoxazole.

Trimethoprim is 2,4-diamino-5-(3,4,5-trimethoxybenzyl) pyrimidine. It is a white to light-yellow, odorless, bitter compound with a molecular weight of 290.3.

Sulfamethoxazole is N¹-(5-methyl-3-isoxazolyl)sulfanilamide. It is almost white in color, odorless, tasteless compound with a molecular weight of 253.28.

Actions: Microbiology: Sulfamethoxazole inhibits bacterial synthesis of dihydrofolic acid by competing with para-aminobenzoic acid. Trimethoprim blocks the production of tetrahydrofolic acid from dihydrofolic acid by binding to and reversibly inhibiting the required enzyme, dihydrofolate reductase. Thus, Bactrim blocks two consecutive steps in the biosynthesis of nucleic acids and proteins essential to many bacteria.

In vitro studies have shown that bacterial resistance develops more slowly with Bactrim than with trimethoprim or sulfamethoxazole alone.

In vitro serial dilution tests have shown that the spectrum of antibacterial activity of Bactrim includes the common urinary tract organisms with the exception of *Pseudomonas aeruginosa*. The following organisms are usually susceptible: *Escherichia coli*, *Klebsiella-Enterobacter*, *Proteus mirabilis* and indole-positive proteus species.

Representative Minimum Inhibitory Concentration Values for Bactrim-Susceptible Organisms (MIC—mcg/ml)

Organism	Trimethoprim alone	Sulfamethoxazole alone	TMP/SMX (1:20)	
			TMP	SMX
<i>Escherichia coli</i>	0.05—1.5	1.0 —245	0.05—0.5	0.95— 9.5
<i>Proteus</i> spp.	0.5 —5.0	7.35 —300	0.05—1.5	0.95—28.5
<i>Indole positive proteus</i>	0.5 —1.5	7.35 — 30	0.05—0.15	0.95— 2.85
<i>Klebsiella-Enterobacter</i>	0.15—5.0	0.735—245	0.05—1.5	0.95—28.5

Human Pharmacology: Bactrim is rapidly absorbed following oral administration. The blood levels of trimethoprim and sulfamethoxazole are similar to those achieved when each component is given alone. Peak blood levels for the individual components occur one to four hours after oral administration. The half-lives of sulfamethoxazole and trimethoprim, 10 and 16 hours respectively, are relatively the same regardless of whether these compounds are administered as individual components or as Bactrim. Detectable amounts of trimethoprim and sulfamethoxazole are present in the blood 24 hours after drug administration. Free sulfamethoxazole and trimethoprim blood levels are proportionately dose-dependent. Following repeated administration, the steady-state ratio of trimethoprim to sulfamethoxazole levels in the blood is about 1:20.

Sulfamethoxazole exists in the blood as free, conjugated and protein-bound forms; trimethoprim is present as free, protein-bound and metabolized forms. The free forms are considered to be the therapeutically active forms. Approximately 44 percent of trimethoprim and 70 percent of sulfamethoxazole are protein-bound in the blood. The presence of 10 mg percent sulfamethoxazole in plasma increases the protein binding of trimethoprim to an insignificant degree; trimethoprim does not influence the protein binding of sulfamethoxazole.

Excretion of Bactrim is chiefly by the kidneys through both glomerular filtration and tubular secretion. Urine concentrations of both sulfamethoxazole and trimethoprim are considerably higher than the concentrations in the blood. When administered together as Bactrim, neither sulfamethoxazole nor trimethoprim affects the urinary excretion pattern of the other.

Indications: Chronic urinary tract infections (primarily pyelonephritis, pyelitis and cystitis) due to susceptible organisms (usually *E. coli*, *Klebsiella-Enterobacter*, *Proteus mirabilis*, and, less frequently, indole-positive proteus species).

Important note: Currently, the increasing frequency of resistant organisms is a limitation of the usefulness of all antibacterial agents, especially in the treatment of chronic and recurrent urinary tract infections.

Contraindications: Hypersensitivity to trimethoprim or sulfonamides. Pregnancy and during the nursing period (See Reproduction Studies).

Warnings: Deaths associated with the administration of sulfonamides have been reported from hypersensitivity reactions, agranulocytosis, aplastic anemia and other blood dyscrasias. Experience with trimethoprim alone is much more limited, but it has been reported to interfere with hematopoiesis in occasional patients. In elderly patients concurrently receiving certain diuretics, primarily thiazides, an increased incidence of thrombopenia with purpura has been reported.

The presence of clinical signs such as sore throat, fever, pallor, purpura or jaundice may be early indications of serious blood disorders. Complete blood counts should be done frequently in patients receiving Bactrim. If a significant reduction in the count of any formed blood element is noted, Bactrim should be discontinued.

At the present time, there is insufficient clinical information on the use of Bactrim in infants and children under 12 years of age to recommend its use.

Precautions: Bactrim should be given with caution to patients with impaired renal or hepatic function, to those with possible folate deficiency and to those with severe allergy or bronchial asthma. In glucose-6-phosphate dehydrogenase-deficient individuals, hemolysis may occur. This reaction is frequently dose-related. Adequate fluid intake must be maintained in order to prevent crystalluria and stone formation. Urinalyses with careful microscopic examination and renal function tests should be performed during therapy, particularly for those patients with impaired renal function.

Adverse Reactions: For completeness, all major reactions to sulfonamides and to trimethoprim are included below, even though they may not have been reported with Bactrim.

Blood dyscrasias: Agranulocytosis, aplastic anemia, megaloblastic anemia, thrombopenia, leukopenia, hemolytic anemia, purpura, hypoprothrombinemia and methemoglobinemia.

Allergic reactions: Erythema multiforme, Stevens-Johnson syndrome, generalized skin eruptions, epidermal necrolysis, urticaria, serum sickness, pruritus, exfoliative dermatitis, anaphylactoid reactions, periorbital edema, conjunctival and scleral injection, photosensitization, arthralgia and allergic myocarditis.

Gastrointestinal reactions: Glossitis, stomatitis, nausea, emesis, abdominal pains, hepatitis, diarrhea and pancreatitis.

C.N.S. reactions: Headache, peripheral neuritis, mental depression, convulsions, ataxia, hallucinations, tinnitus, vertigo, insomnia, apathy, fatigue, muscle weakness and nervousness.

Miscellaneous reactions: Drug fever, chills, and toxic nephrosis with oliguria and anuria. Periarteritis nodosa and L. E. phenomenon have occurred.

The sulfonamides bear certain chemical similarities to some goitrogens, diuretics (acetazolamide and the thiazides) and oral hypoglycemic agents. Goiter production, diuresis and hypoglycemia have occurred rarely in patients receiving sulfonamides. Cross-sensitivity may exist with these agents. Rats appear to be especially susceptible to the goitrogenic effects of sulfonamides, and long-term administration has produced thyroid malignancies in the species.

Dosage and Administration: Not recommended for use in children under 12 years of age.

The usual adult dosage is two tablets every 12 hours for 10 to 14 days.

For patients with renal impairment:

Creatinine Clearance (ml/min)	Recommended Dosage Regimen
Above 30	Usual standard regimen
15-30	2 tablets every 24 hours
Below 15	Use not recommended

How Supplied: Tablets, containing 80 mg trimethoprim and 400 mg sulfamethoxazole—bottles of 100 and 500; Tel-E-Dose® packages of 1000; Prescription Paks of 40, available singly and in trays of 10. Imprint on tablets: ROCHE 50.

Reproduction Studies: In rats, doses of 533 mg/kg sulfamethoxazole or 200 mg/kg trimethoprim produced teratological effects manifested mainly as cleft palates. The highest dose which did not cause cleft palates in rats was 512 mg/kg sulfamethoxazole or 192 mg/kg trimethoprim when administered separately. In two studies in rats, no teratology was observed when 512 mg/kg of sulfamethoxazole was used in combination with 128 mg/kg of trimethoprim. However, in one study, cleft palates were observed in one litter out of 9 when 355 mg/kg of sulfamethoxazole was used in combination with 88 mg/kg of trimethoprim.

In rabbits, trimethoprim administered by intubation from days 8 to 16 of pregnancy at dosages up to 500 mg/kg resulted in higher incidences of dead and resorbed fetuses, particularly at 500 mg/kg. However, there were no significant drug-related teratological effects.

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I certify that the statements made by me above are correct and complete.

REUBEN BERMAN, M.D., Editor-in-Chief

President's Letter



Shortening the Hospital Stay

THERE IS LATELY a strange swell of enthusiasm for shortening hospital stay. Many of us remember great surges of the past toward brief hospitalization—the observation that early ambulation of older people resulted in lower morbidity and mortality as well as much earlier return home was an impressive breakthrough. The developments in anesthesia which permitted not only more extensive surgical procedures but resulted in diminution of trauma and better survival had a similar effect. Antibiotics shortened hospital stays of patients with infectious diseases, and in many cases obviated the need for hospitalization at all. The phenothiazines of the 50's sent many psychiatric patients out of hospital and back to families in record short order. These advances had to do with improved patient care, lessened morbidity and lowered mortality.

The new vogue in short hospital stay seems to have little to do with improved care—or relieving pain—or saving lives. Rather clearly it is based on economic considerations. There is much talk of 5th percentile review, 90th percentile review, utilization review, pre-admission authorization. There even was a recent article in a renowned scientific journal which ecstatically described procedures resulting in spectacular shortening of patient stay. The strange and awful thing is that little was mentioned about treatment results, relief of suffering, patient comfort or ultimate outcome.

This new interest in shortening hospital time appears to be mothered by Congress and fathered by no one knows whom. One wonders if the infant is parthenogenic or possibly if the putative father could be the insurance industry. In any case, with paternity in doubt there are many among us who have no hesitation in questioning the legitimacy (or illegitimacy) of this infant.

What if the insurance industry does turn out to be the true father of this lusty sprout? Can

this monetary giant seduce the infant's mother into an indiscretion which will end in impairment of medical care? Is it true that he who pays the fiddler calls the tune? Certainly this industry represents a monstrous accumulation of wealth—some say an undue accumulation. I know of no wealthy doctors save those few who inherited fortunes from an ancestor of unusual resources or the even fewer who married a wealthy girl and settled into a life of affluence. On the other hand, I know of many wealthy insurance companies and insurance executives—and they wield enormous power. One observes on driving into almost any American city, that one can view the skyline and identify with fair assurance the largest and grandest structure as being the headquarters of an insurance company. Even further, one can recount stories of insurance industry arrogance in dealing with municipalities, with politicians, with people and now frighteningly with medical care of our patients.

What must our posture be as physicians? We who are skilled in the care of illness by training, by experience and by mature judgment must continue to be more concerned for the health of our patients than for the financial well-being of an industry or a department of government. The welfare of the sick must be measured in humanitarian rather than fiscal terms. Physicians must be more concerned with relieving and healing and in helping than with shortening a stay for a statistically described condition from 7.8 to 7.6 days.

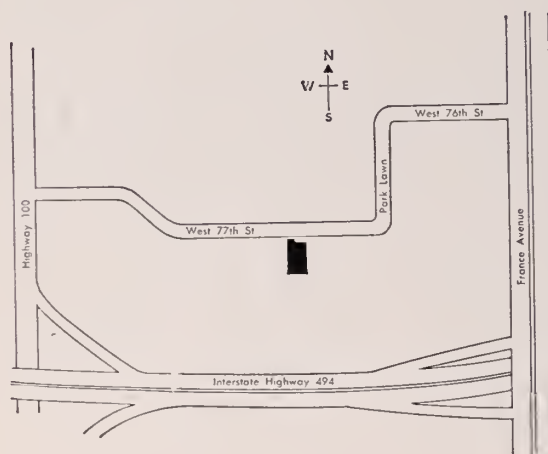
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Carotid-Cavernous Fistula

EDWARD L. SELJESKOG, M.D., Ph.D.*

OF THE MANIFOLD MEDICAL and surgical problems encountered in neurosurgical practice, few lesions have garnered the attention that has been afforded the problem of carotid-cavernous fistula. This interest has mainly related to the profound neurologic impairment frequently present-

ing in these patients, but secondarily it has related to the striking associated signs and symptomatology. Until recently, the general topic of carotid-cavernous fistula was usually discussed under the heading of "Pulsating Exophthalmus," but it should be noted that not all cases of carotid-cavernous fistula demonstrate this classical finding. Through the years, carotid-cavernous fistulae have been known by a number of different titles: aneurysm of the ophthalmic artery (or vein), arterial-venous anastomosis, orbital erectile tumor, pulsating exophthalmus carotid-cavernous aneurysm, and, of course, the most common term, carotid-cavernous fistula (CCF).

History

In 1811, Benjamin Travers, a London surgeon, first described the basic pathophysiology in CCF. He proposed that the symptoms and findings in this entity were related to a fistulous connection between the carotid artery and the cavernous venous sinus. Knowledge of William Hunter's classic description of a typical A-V fistula, of some fifty years earlier, led Travers to this account. In 1808, Travers had assisted Ashley Cooper, another London surgeon, with a carotid ligation for an entirely different problem. He then correctly surmised that

*Department of Neurosurgery, University of Minnesota Medical School, Minneapolis, Minnesota.
See editorial, page 966.

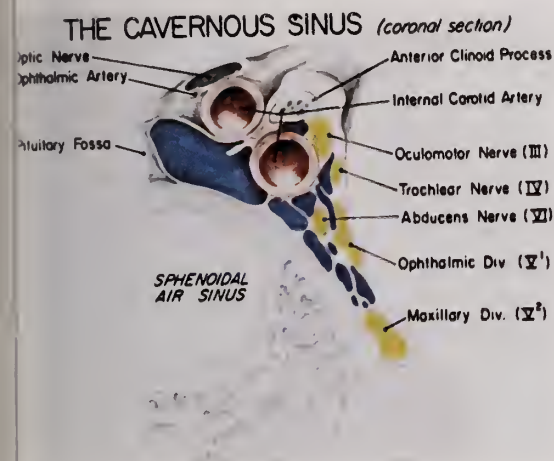


Fig. 1—Cross section of the sella and cavernous sinus demonstrating the intracavernous carotid artery completely surrounded by the septated venous sinus. Note also the relationship of the carotid artery to the III, IV, V, and VI cranial nerves.

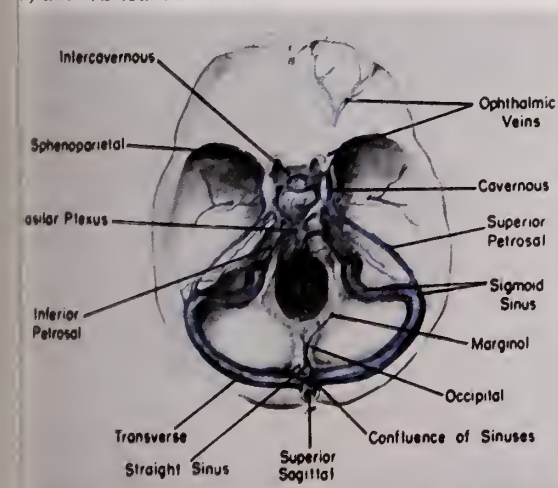


Fig. 2—Horizontal section of the skull revealing the major intracranial dural venous sinuses and their communication with the cavernous sinus.

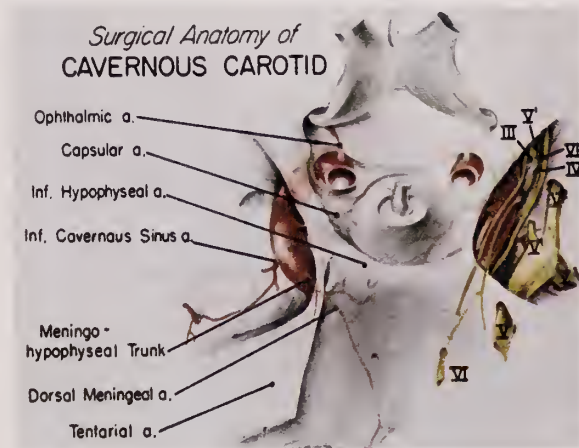


Fig. 3—View of the cavernous sinus illustrating the small intracavernous branches of the carotid artery. These vessels may significantly enlarge and serve as a continued arterial supply to the incompletely occluded CCF.

if the artery leading into a fistula could be ligated, the potential for cure of this abnormality then existed. Management of his case in this fashion then resulted in an apparent cure.

Guthrie, in 1823, carried out an autopsy on a probable case of CCF. Surprisingly, he described what he thought to be an aneurysm of the ophthalmic artery, but after reading the details of the case, one is soon left with the realization that this patient likely had a CCF and that the apparent ophthalmic artery aneurysm was in reality an aneurysmal dilatation of one of the ophthalmic veins. Nevertheless, this led British medical thought to consider the general problem of "Pulsating Exophthalmus" as being related to an aneurysm of either the ophthalmic artery or vein.

The "French School of Medicine" developed a different concept of this problem. Delens, in 1879, described in detail a typical CCF which was related to a ruptured intracavernous carotid artery aneurysm. Additionally, he described a second type of case involving a post-traumatic CCF. In this patient, there was a traumatic disruption of the arterial wall with a secondarily developing carotid artery-cavernous venous sinus fistula. In actuality, this traumatic lesion had been duplicated in the morgue by driving a spike into the orbit thereby demonstrating the potential for development of this arterio-venous connection. Gradually, it became quite universally accepted that this entity was basically a problem of a fistulous connection between the intracavernous carotid artery and the cavernous venous sinus.

Two general causes of CCF are then apparent. First, those cases which are spontaneous in nature and which are thought to be related to rupture of an intracavernous carotid aneurysm. Second are those cases which are traumatic in origin, usually related to a skull fracture, or penetrating cranial injury. In 1966, Hamby¹ in his excellent monograph and presentation of 42 cases, found a nearly equal number (19/23) of the traumatic and spontaneous types. The general literature, however, seems to imply a ratio of about three to one and, as one might anticipate, the traumatic fistula is much more common in the young male, undoubtedly a reflection of the greater exposure of this patient group to injuries and their sequelae.

Spontaneous fistulae are strikingly more common in women especially during pregnancy with a much greater frequency than one would anticipate from a strict statistical appraisal of the problem.

Of Hamby's¹ 16 cases of spontaneous CCF in women, two had onset of their symptoms during pregnancy. Since this type of CCF is thought to be due to rupture of an intracavernous carotid aneurysm, it is possible that vascular changes, hypertensive factors and the straining associated with pregnancy and delivery may predispose this type of aneurysm to rupture during this period of life. An additional factor appears to be a congenital predisposition to the development of intracavernous aneurysms, since several cases of unilateral CCF have been found to have an asymptomatic contralateral intracavernous carotid aneurysm. Intracavernous aneurysms are extremely uncommon; therefore, this degree of bilaterality is much greater than one would statistically anticipate.

In general, traumatic CCF develops following a head injury where there is a basilar skull fracture. The fracture usually traverses the floor of the middle fossa to the parasellar area involving the carotid artery in this region. A number of delayed cases of traumatic CCF have been reported, actually some several weeks following the initial injury. It has been proposed that in this situation there initially develops a traumatic intimal tear, which then subsequently develops an aneurysmal dilatation, ultimately rupturing, creating the fistula. Generally, however, the signs and symptoms of CCF are present quite early following the traumatic episode. Occasional cases of this type of fistula are related to a penetrating injury of the orbital area, as in Delens's early description.

Anatomy

The carotid artery within the cavernous sinus lies in a unique position as it passes from the bony carotid canal into the intracranial cavity. Within the sinus, the artery lies between the two leaves of the dura nearly surrounded completely by venous blood (Figure 1). The carotid artery is obviously predisposed to develop an A-V fistula with any type of disruption of its wall in this location.

The cavernous sinus is one of the major intracranial dural venous sinuses receiving a considerable portion of the superficial venous drainage from the inferior frontal and temporal lobes (Figure 2). Anteriorly, there is communication through the superior orbital fissure with the superior and inferior ophthalmic veins and through them to the extracranial facial venous system. This is the well known avenue by which facial and orbital infec-

ion travel producing a cavernous sinus phlebitis with catastrophic thrombosis.

Within the cavernous sinus several important structures lie in close apposition to the carotid artery (Figure 1). These include the ophthalmic division (V_1) of the trigeminal nerve, as well as the VI cranial (abducens) nerve to the lateral rectus muscle. Both of these structures lie quite laterally, while more medially and superiorly lie the II and IV cranial nerves (oculomotor and trochlear), supplying the remaining extraocular muscles. As a consequence, any type of pathologic process distending and stretching the sinus walls will likely affect these structures. This is particularly true when the nerves are stretched over a mass such as an aneurysm.

The ophthalmic artery is the first intracranial, intradural branch of the carotid artery. This vessel usually arises just as the carotid artery penetrates the dura beneath the optic nerve (Figure 3). However, this vessel many times originates within the cavernous sinus and can thereby serve as an additional source of arterialized blood to the fistula through reversal of its blood flow from its orbital-facial collateral. Minute intracavernous branches may become important in the problem of CCF, in that they may enlarge and serve as a source for continued arterial feeding of an incompletely occluded fistula.²

Signs and Symptoms

Bruit

It is stated that about 80% of the cases of CCF have an audible bruit. This may or may not be audible to the patient. In the 42 cases of Hamby¹, 41 eventually developed a bruit and in 29 it was the initial symptom. The patient may describe the bruit under such terms as: bird-like, squealing, roaring, or humming. Occasionally, the bruit is loud enough to be heard by an observer some several feet distant and may be the most seriously disabling symptom. Many patients soon discover that carotid compression results in a decrease in the intensity of their bruit and again, in Hamby's¹ series, 34/37 tested patients developed a definite alteration or obliteration of the bruit with this maneuver.

Exophthalmus and Pulsations

The development of exophthalmus is generally noted the first day following an injury. However, some cases only develop this problem after sev-

eral weeks as has been previously discussed. As expected, the exophthalmus invariably begins on the side of the fistula with possible later contralateral signs. Basically, the proptosis is secondary to orbital venous hypertension, particularly involving the superior ophthalmic vein and usually producing a downward and outward protrusion of the eye (Figures 4-6). Occasional individuals afflicted with this condition have reported an increase in their exophthalmus with straining or coughing. In Hamby's¹ series, 40/42 patients had evidence of proptosis. In 1950, Sir Geoffrey Jefferson³ described a case of spontaneous CCF that initially developed exophthalmus contralateral to the fistula. In this patient, there was noted a rather large ipsilateral intracavernous aneurysm which likely obstructed the forward venous outflow into the ipsilateral orbit, while allowing the increased venous pressure to be transmitted through the intercavernous sinuses to the contralateral cavernous sinus and orbit.

In Hamby's¹ series of cases, 14/42 patients demonstrated the presence of a pulsating type of exophthalmus. Many times these pulsations were not visible, but palpable only to the finger tip.

Chemosis

This sign is a frequent finding with problems of CCF and includes the basic problem of scleral injection (Figures 7 and 8) as well as edema of the lid and conjunctiva. (Figures 9 and 10). Again this is related to intraorbital venous hypertension. Eyelid edema may be so severe (Figures 11 and 12) that the lids will evert, leading to secondary infection. Occasional cases may also demonstrate epistaxis related to venous congestion of the nasal mucosa.

Visual Failure

Visual failure is also a frequent finding. It is thought that this primarily relates to a depression of retinal blood flow secondary to venous hypertension. Other important factors include papilledema with retinal edema and venous hemorrhage, retinal hemorrhage and detachment, vitreous hemorrhage, glaucoma (secondary to anterior chamber venous hypertension), stretching of the optic nerve (due to exophthalmus), corneal opacities (secondary to neovascularization), and corneal ulceration and edema (secondary to exposure and infection). About 50% of the cases of CCF ultimately develop some degree of visual loss. Usually, one notes, after successful treat-



Fig. 4—Frontal view illustrating typical exophthalmus noted in CCF.



Fig. 5—Frontal view illustrating typical exophthalmus noted in CCF.



Fig. 6—Frontal view illustrating typical exophthalmus noted in CCF.



Fig. 7—Typical scleral injection found in CCF.



Fig. 8—Typical scleral injection found in CCF.



Fig. 9—Example of the typical chemosis found in CCF.



Fig. 10—Example of the typical chemosis found in CCF.

ment, a primary type of optic atrophy, suggesting that the majority of visual loss is related to retinal ischemia or nerve stretch.

Extraocular Nerve Palsy

Paralysis of one of the extraocular muscles in problems of CCF is a relatively common finding. The VI nerve is the most common single nerve involved, but usually the situation is one of (Figure 13) multiple extraocular muscular (EOM) involvement. In Hamby's¹ series, 24/42 patients had symptoms of diplopia. Exophthalmus rather than direct nerve distortion may also contribute to this problem.

Headache

Headache is also a frequent complaint in CCF. It is thought to be mainly due to intracranial dural venous distention, however, increased intracranial pressure may also play a role.

Other Cranial Nerve Palsies

As one might anticipate from the anatomy of the area (Figures 1 and 3), the trigeminal nerve and most particularly its ophthalmic division (V_1) may be involved in CCF. This is more frequent in the spontaneous type of fistula with an associated aneurysm, where there may be direct stretching of the nerve by the aneurysm and dilated sinus. Of Hamby's¹ cases, 12/42 had evidence of hypesthesia involving V_1 . Other cranial nerves may be involved, such as VII or VIII, but this usually is related to a basilar skull fracture, rather than by involvement with the fistula.

Vascular Changes

Very occasionally, one may note dilatation of facial veins in the area of the CCF. Undoubtedly, this is related to venous hypertension of orbital collateral vessels. On angiography, an increased diameter of the carotid and ophthalmic arteries may be noted, but problems of high output cardiac failure are rarely seen, since the fistula usually becomes locally symptomatic before the problem has any serious hemodynamic significance from the cardiac standpoint.

Cerebral Ischemia

This again is not an unusual problem in CCF, particularly in the elderly. It is felt to be primarily related to the siphoning effect of the fistula, essentially "robbing" the ipsilateral hemisphere of a significant portion of its carotid blood flow (Figure 14). One should bear in mind that in this type of case, symptoms of cerebral ischemia would only be aggravated by an extracranial carotid artery ligation.

Differential Diagnosis

In the uncomplicated case of CCF, the diagnosis is usually obvious, particularly when confronted with the symptom complex of pulsating exophthalmus and an orbital bruit. The suspected diagnosis is then further corroborated when or notes relief of the symptomatology by carotid compression. However, a number of other problems should be considered in the differential diagnosis. These include:

Cavernous Sinus Thrombosis

In this problem, the diagnosis is usually evident with an antecedent history of fever and signs and symptoms of sepsis. Occasionally, these individuals can present with an isolated problem of proptosis, and at times chemosis and EOM paresis. Visual failure may be present to some degree due to the infection and/or associated papilledema. The differentiation really relates to the patient's prior history of infection, but additionally there will be no evidence of pulsation or bruit.

Retro-Orbital Tumor

In general, this type of problem has a rather insidious onset, rather than the abrupt onset that is usually associated with a spontaneous or traumatic CCF. The patients frequently have a superior orbital fissure syndrome, which includes involvement of the III, IV, and VI cranial nerves as well as the V_1 division of the trigeminal nerve. There will usually be no bruit, nor evidence of pulsation so often noted with a CCF.

Orbital Aneurysms

True arterial or venous orbital aneurysms are a rarity in clinical practice. The differentiation from CCF is quite difficult, since basically, the patient does present with a problem of pulsating exophthalmus. Undoubtedly, a number of the early descriptions of orbital aneurysms, were in actuality CCF. These individuals do not have the signs and symptoms of venous engorgement and angiography ultimately defines this type of lesion.

Orbital A-V Malformation

Again this is a rare entity. Undoubtedly, most of the early cases of orbital A-V malformation were related to venous hypertension and a CCF. Again this problem is delineated by angiography which obviously is a necessity to clearly differentiate this unusual problem from a true CCF.

Orbital Encephalocele

This unusual problem is related to a herniation of cerebral tissue through a congenital or post-traumatic defect in the orbital roof. These in-

Individuals obviously become more symptomatic if intracranial pressure is increased for any reason. The exophthalmus in this situation is secondary to the mass of the encephalocele and the pulsatile quality is related to transmitted cerebral pulsations. These patients will not have a bruit and x-rays of the skull will reveal evidence of an orbital roof defect, as well as possible associated findings of increased intracranial pressure. Additionally, the patients rarely have any significant visual loss or extraocular involvement, nor is there any evidence of orbital venous hypertension.

Diagnosis

The diagnosis of a CCF is primarily clinical, taking into account the classical clinical signs, symptoms and history. If necessary, the diagnosis can be corroborated by a carotid compression test and angiography. Angiography may reveal a number of different vascular patterns, but basically, the fistula is revealed by a very prompt and early opacification or leakage of contrast material into the cavernous sinus, as soon as the contrast media reaches the carotid siphon (Figures 15 and 16). Occasionally, in spontaneous cases, an intracavernous aneurysm may be noted, although this is infrequent due to the dense opacification of the sinus region by the contrast material (Figures 17 and 18). The venous drainage from the cavernous sinus may be along a number of different avenues. It may be chiefly forward into the superior ophthalmic vein and orbit (Figure 19 and 20), but at times there is very prompt filling of the sphenoparietal sinus, sylvian vessels and then the superior sagittal sinus (Figure 21). The major venous drainage can also be in a posterior direction into the basilar venous plexus and petrosal sinuses to the region of the jugular bulb (Figures 22 and 23). An additional point of interest relates to the jugular venous oxygen tension, which in CCF is usually elevated. This should not be considered as an essential part of the patient's initial evaluation.

Management

The Untreated Carotid-Cavernous Fistula

A number of possibilities exist for the ultimate destiny of the untreated CCF. These include: (A) Spontaneous closure, (B) Fatal hemorrhage, and (C) Static or slowly progressive signs and symptoms.

Spontaneous Cure In a review of the problem of CCF, Sattler,⁴ in 1920, garnered from the literature some 322 cases of CCF. Eighty-one patients of this group had no treatment and in sixteen there developed an apparent spontaneous cure. Pool⁵ in discussing this review, pointed out that a large number of these patients had a subsequent recurrence of their symptomatology (13/16). Therefore, only 3/81 (3.7%) patients who had no treatment did there develop an apparent spontaneous cure. The mortality in this group of 81 patients was about 10% and 72% of the patients had no improvement in their symptomatology, which at times was incapacitating. Hamby's¹ monograph indicated that 4/42 patients of his group had no specific treatment. One of these patients developed an apparent spontaneous cure, one remained stable without any increase in signs and symptoms, while another developed an apparent closure of the fistula following angiography; however, during this process, the patient developed ipsilateral visual loss. A fourth patient died without any particular treatment. In summary, it would appear that in untreated patients the potential for spontaneous cure is small, while the chances of static or increasing morbidity and mortality are significant.

Fatal Hemorrhage Sattler,⁴ in his review of 322 cases, found only six cases with fatal hemorrhage directly related to the CCF. Half of these were intracranial and the remainder related to epistaxis.

Static or Slowly Progressive Signs and Symptoms As noted above, the majority of untreated patients fall within this category. Undoubtedly, from the aspect of continued or slowly progressing morbidity, one should be encouraged to seriously consider an attempt at cure of this problem. Without question, the small, minimally symptomatic fistula in the elderly or the poor surgical risk patient may indicate a course of watchful waiting. In the majority of patients, some form of corrective therapy should usually be considered.

Definitive Treatment

General Principles When considering the management of an A-V fistula, the basic general surgical principles are those of obliteration of all arterial feeding vessels and additionally, if possible, obliteration of the venous drainage. One attempts to control both the inflow and outflow of the fistula and, if feasible, total excision of the lesion. Obviously, the critical location of a CCF negates consideration of this latter course of action. Gen-



Fig. 11—One case of severe orbital and lid edema found in CCF.

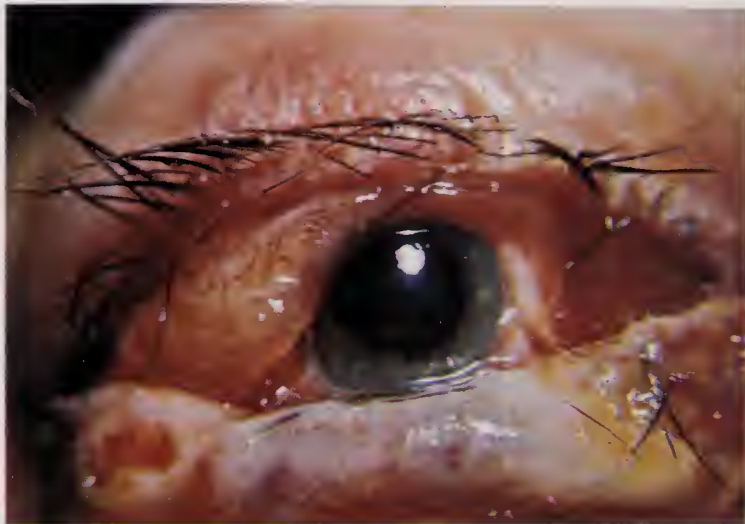


Fig. 12—Another case of severe orbital and lid edema found in CCF.



Fig. 13—Exophthalmus, chemosis and total EOM palsy found in CCF.

erally, the surgical attack upon a CCF has primarily been directed at the arterial feeding vessels.

Types of Management

Carotid Compression This type of approach toward controlling a CCF was used rather extensively in the 1800's. The basic approach was that of continuous carotid compression by a team of therapists in an attempt to eradicate the fistula by a thrombus forming within the compressed carotid artery. At times, this compression type of therapy would last for hours at end and, as one would anticipate, closure of the fistula was infrequent.



Fig. 14—Early lateral carotid angiogram in a case of CCF revealing prompt opacification of the cavernous sinus with minimal intracranial vascular filling.



Fig. 15—Lateral view carotid angiogram (arterial phase) in a case of CCF. Note the early and prompt opacification of the cavernous sinus and superior ophthalmic vein.

Venous Occlusion Direct injection of sclerosing agents into the superior ophthalmic vein has been tried in an attempt to thrombose the fistula. The literature generally indicates that this is not a particularly successful endeavor.

Cervical Carotid Ligation The next avenue of therapy essentially was that of an expansion of the carotid compression approach, i.e. ligation of the *extracranial* carotid artery. This obviously increased the potential for cure and in actuality around 40-60% of patients who had this type of treatment were either cured or improved. As noted earlier, one must bear in mind the possibility of worsening or precipitating cerebral ischemia through a siphoning effect of collateral blood flow into the fistula. In this situation, cerebral collateral blood flow is drawn toward the low pressure of the fistula and away from the cerebral hemisphere.

Intracranial-Extracranial Carotid Artery Occlusion (Trapping) In 1933, Hamby and Gardner⁶

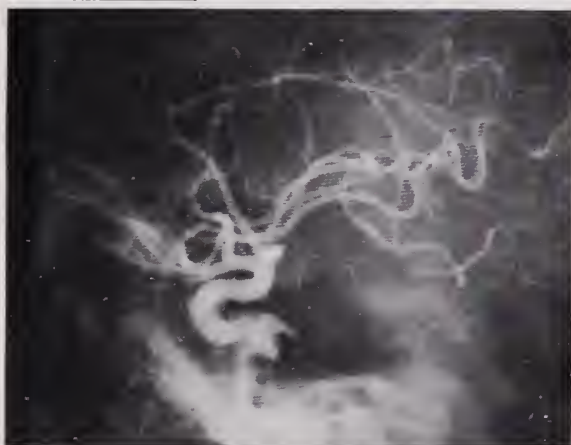


Fig. 16—Early lateral carotid angiogram with "leakage" of contrast material into the cavernous sinus in the region of the carotid siphon.

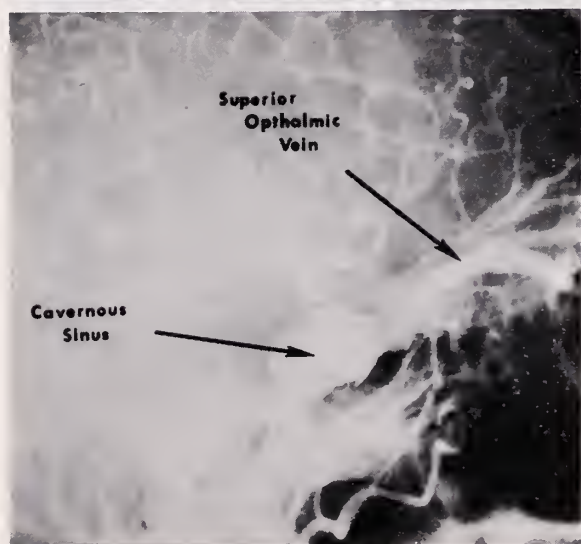


Figs. 17 (top) & 18 (bottom)—AP and Lat. carotid angiograms in two cases of CCF. Note the dense opacification and enlargement of the cavernous sinus.

successfully treated a CCF using a combined intracranial approach. Their procedure consisted of an intracranial occlusion of the internal carotid artery just proximal to its posterior communicating branch and at the same time ligating the internal carotid artery in the neck. Rather ironically, this did not result in a cure due to persistent ophthalmic artery collateral flow into the fistula, however, the patient was much improved symptomatically. Following this initial case of Hamby, a number of patients began to be treated in this manner. This resulted in a higher cure rate, and symptomatic improvement obviating the problem of siphoning away collateral blood flow. Gradually, this combined approach in managing CCF

became an accepted procedure.

In 1942, Adson⁷ pointed out that a frequent reason for failure of fistula occlusion in a large number of these "Trapped" cases was related to continued feeding of the A-V fistula via the ophthalmic artery and its collaterals. Since this observation, a number of surgeons have stressed the importance of occluding this important small carotid branch when attempting to control a CCF



Figs. 19 (top) & 20 (bottom)—Lateral views of carotid angiogram in two cases of CCF. Note the early filling of the cavernous sinus and the venous drainage forward into the orbit.

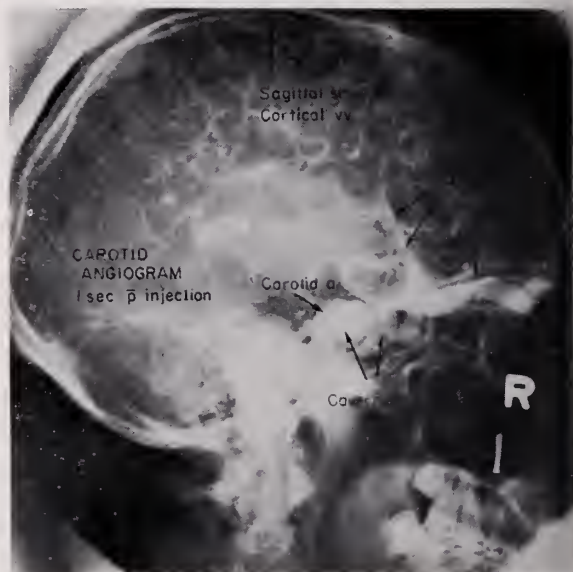


Fig. 21—Lateral view of carotid angiogram (arterial phase) in a case (Fig. 5) of CCF. Note the opacification of the cavernous sinus and the rapid passage of contrast material into the sphenoparietal sinus, sylvian veins, and cortical veins near the sagittal sinus.

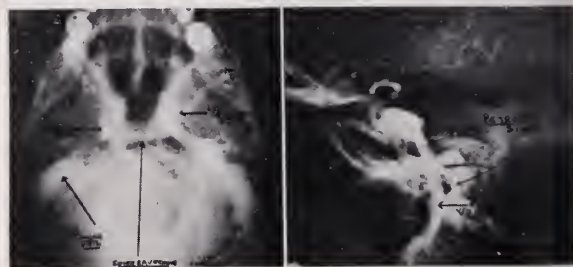


Fig. 22—VSM and lateral carotid angiogram views (early arterial phase) in a case (Fig. 10) of CCF. Note the opacification of both cavernous sinuses and the egress of contrast material into the contralateral petrosal sinuses and jugular outflow.

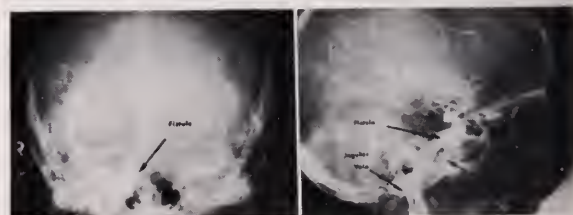


Fig. 23—AP & Lat. carotid angiogram views revealing prompt filling of the cavernous sinus and venous drainage posteriorly into the jugular outflow.

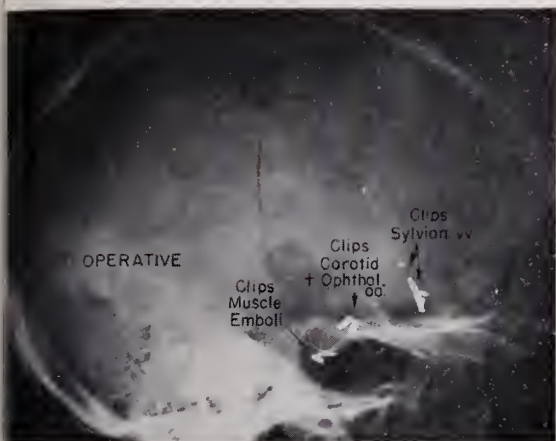


Fig. 24—Lateral postoperative skull Xray in case of CF (Figs. 5 & 21) demonstrating surgical clips on the carotid and ophthalmic arteries as well as two intracarotid muscle emboli tagged with silver clips. The patient had an uneventful course and was discharged neurologically normal in seven days.

In the past, surgical occlusion of the ophthalmic artery at its carotid origin had been considered with great trepidation because of possible retinal chemia. It was soon apparent that collateralization into the ophthalmic artery was present through the external carotid system and that this did not seem to be a particularly significant problem. The visual loss in CCF is probably unrelated to the surgical procedure, and has its inception prior to any attempted surgery.

An additional problem that one must constantly bear in mind in any surgical procedure directed toward the carotid artery relates to the problem of cerebral ischemia. As noted previously, the dangers of this problem are quite significant in those cases of *extracranial* carotid ligation due to the increased siphoning effect into the fistula. Where a one stage trapping procedure is carried out, the risks of this siphoning effect are obviated, but still present are the dangers of cerebral chemia due solely to the carotid occlusion. This may be particularly pertinent in the elderly patient who demonstrates angiographically no evidence of "crossover" through the anterior communicating artery.

Carotid Embolization In 1931, a surgical cure of a CCF was reported by embolization.⁸ That same year, Gardner⁶ used this same type of approach using a small muscle embolus. Other reports^{9,10} have described "controlled" embolization

techniques. Embolization is, of course, best preceded by an intracranial clipping of the carotid artery to prevent any distal migration of the embolus into the cerebral circulation (Figure 24). This basic approach, using either muscle emboli or other foreign material has proved to be increasingly popular for the management of CCF when coupled with the well accepted trapping procedure.

Direct Attack Several case reports¹¹⁻¹³ have appeared in the literature describing a direct attack on the CCF. The cavernous sinus is opened under direct vision and packed with muscle. Generally, these patients have had multiple surgical procedures with recurrence mainly through hypertrophy of the very small intracavernous branches (Figure 3). With this situation, the fistula is curable only with this type of approach.

Summary

The problem of CCF is relatively uncommon but not so unusual that it should be unfamiliar to the medical practitioner. The classical signs and symptoms of a CCF make the diagnosis quite apparent from clinical examination and one is only led to the diagnosis when one's clinical suspicion has arisen and if one searches for the associated findings. The suspected clinical diagnosis is quite easily confirmed by carotid angiography.

With specific regard to the management of CCF, it would seem that the surgical approach, when undertaken, should be vigorous in an attempt to cure the fistula with the first surgical endeavor, particularly since therapy in a stepwise fashion frequently does not result in cure and may compound the difficulty of later surgical approaches. In reviewing the various surgical methods of management, it would seem that occlusion of both the intracranial and extracranial carotid artery (trapping) is a logical approach to the problem and will result in a high rate of occlusion of the fistula. Efforts should be made to also occlude the ophthalmic artery since it may become an important later persistent feeder of the fistula. If the ophthalmic artery is not closed, consideration should then be made for embolization of the fistula through the internal carotid artery after its intracranial clipping.

Ophthalmia Neonatorum

Value of Prophylactic Treatment

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OPTHALMIA NEONATORUM due to *Neisseria gonorrhoeae* is still a classic example of oculo-genital disease. Due to the increase in the incidence of gonorrhea in recent years,¹ there is an increasing potential for gonococcal conjunctivitis in the newborn. This concerns not only obstetricians, but ophthalmologists, pediatricians and general practitioners as well.

As in other types of venereal disease, reported cases of genital gonorrhea represent only a small fraction of all cases. It is estimated that as many as two million new cases occur annually in the United States² and as many as 60 million new cases occur in the world.¹

The purpose of this paper is to report a recent case of Ophthalmia neonatorum seen by one of us (WBB) and to discuss the diagnosis, differential diagnosis and controversy regarding prophylaxis of this disease.

Case Report

A one-week old caucasian girl was seen because of increasing drainage from the right eye of three days duration. The 39-week gestation was complicated by maternal preeclampsia early in the third trimester, by *Trichomonas vaginitis* and by otitis externa. Maternal history was negative for venereal disease and a serological test for syphilis (VDRL) was negative. Labor was complicated only by premature rupture of membranes (36 hours prior to delivery). The birth weight was 3125 gms. 1% silver nitrate prophylaxis was recorded as being given in the delivery room within 30 minutes of delivery. A physical examination of the child was within normal

limits and she was discharged with her mother three days after birth.

The next day a small amount of drainage was noted from the right eye becoming profuse by the fifth day. On the sixth day the child was seen in an emergency room, a smear and culture taken of the conjunctiva, and sulfacetamide ophthalmic drops (10%) started for 'conjunctivitis'.

On the seventh day, the child was seen for the first time by one of us (WBB). A yellow-white, purulent conjunctival discharge was present on the right, and to a lesser extent on the left (Figure 1). On the right, there was edema and hyperemia of the eyelids, and chemosis and injection of the conjunctiva. The cornea was normal.

The smear taken the day before showed gram negative intracellular diplococci (Figure 2) confirmed bacteriologically as *Neisseria gonorrhoeae* one day later. A cervical smear and culture of the mother was positive for *Neisseria gonorrhea*. Repeated questioning of the mother brought out an admission of having been 'adequately treated for gonorrhea approximately one year ago.

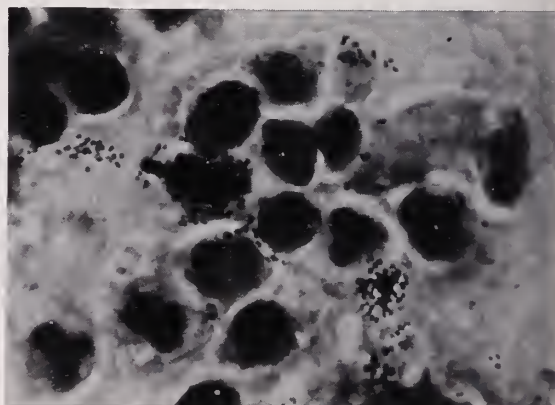


Fig. 2—Gram stain of conjunctival smear from another case of gonococcal conjunctivitis. Gram stain x 300.



Fig. 1—Patient at day seven. Note purulent drainage coming from the right eye and swollen lids. Compare with figure three.

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The child was treated with 300,000 units of CR Bicillin I.M. and 50,000 units of penicillin VK orally. Erythromycin ointment was given every two hours to both eyes.

Five days later, only minimal residual hyperemia was present (Figure 3) and the child was discharged from the clinic without further treatment.



Fig. 3—Five days after treatment. No drainage is present and no lid swelling.

Discussion

Historical Survey

After its discovery in the secretions of urethritis by Neisser in 1879,³ *Neisseria gonorrhoeae* was recognized as a cause of neonatal conjunctivitis, being found by numerous investigators.^{4,5} The introduction of prophylaxis by Credé in 1881 resulted in a significant decrease in the incidence of the disease.⁶ Before the use of silver nitrate 10% of babies born in the University Clinic in Leipzig had ophthalmia neonatorum. After the introduction of silver nitrate, the incidence dropped to 0.3%.⁷

With the introduction of staining techniques, such as the gram stain, other organisms besides gonococcus became associated with neonatal conjunctivitis. Stargardt⁸ and Heymann⁹ discovered

epithelial cytoplasmic inclusion bodies in some cases which are now called inclusion blennorrhea or inclusion conjunctivitis. Morphologically, these are identical with those inclusion bodies found in trachoma and are due to the large virus *Chlamydia oculogenitalis*.¹⁰

Perhaps as a result of the current "sexual revolution," inclusion conjunctivitis is now the most frequent type of neonatal conjunctivitis in the United States.¹⁰ Although inclusion conjunctivitis of the newborn has been considered a benign disease, recent reports of corneal and palpebral scarring have appeared.¹¹ And as chlamydial conjunctivitis often appears as a purulent papillary conjunctivitis it must be differentiated from gonorrheal ophthalmia.¹⁰ It should also be noted that Credé prophylaxis does not prevent inclusion conjunctivitis, nor does it effect staphylococci or other infectious agents which are ordinarily extragenital in origin.¹² Although many organisms have been isolated in neonatal conjunctivitis, (Table 1) many others are being added to the list. *Neisseria Gonorrhea*, *Chlamydia Oculogenitalis* and *Herpes Sim-*

TABLE 1
Etiologic Classification of 261 Cases of Ophthalmia Neonatorum*

Etiology determined:	Number	Percentage
<i>Staphylococcus aureus</i> (hemolytic)	135	51.7
<i>Diplococcus pneumoniae</i> (pneumococcus)	34	13.0
Inclusion blennorrhea virus	23	8.8
<i>Diplococcus pneumoniae</i> and <i>Staphylococcus aureus</i>	15	5.7
<i>Haemophilus influenzae</i>	7	2.6
Lacrimal conjunctivitis	5	1.9
<i>Diplococcus pneumoniae</i> , 2		
<i>Staphylococcus aureus</i> , 3		
<i>Escherichia coli</i>	2	0.76
<i>Streptococcus viridans</i>	2	0.76
<i>Staphylococcus aureus</i> and <i>Haemophilus influenzae</i>	3	1.1
<i>Neisseria gonorrhoeae</i>	1	.38
Unknown etiology:		
Negative (<i>C. xerosis</i> , <i>C. Hoffmanni</i> , <i>Staphylococcus albus</i> , or sterile)	34	13.0
	261	

Incidence of ophthalmia neonatorum in 3,939 new born infants 6.6

Incidence of gonorrheal ophthalmia022

*This Table is reprinted from the Transactions of the American Ophthalmological Society, Vol. 34:346-371, 1936,¹³ with the permission of Dr. Phillips Thygeson and the American Ophthalmological Society.

plex virus Type 2 are the most frequent organisms genitally transmitted; however, *Mimcae*, *Candida*, and *Mycoplasma* have been reported as being transmitted genitally.¹⁰

TABLE 2

Agent	Time of Onset	Type of Onset
Silver Nitrate	Immediate	Subacute to Mild
Gonorrhoeae	3 to 5 days	Hyperacute
Staphylococcus	7 to 10 days	Acute to Mild
Inclusion	5 to 11 days	Hyperacute to Mild
Conjunctivitis		

Clinical Picture

Gonococcal ophthalmia neonatorum usually has a hyperacute onset three to five days postpartum. The amount of pus produced is so heavy that it must constantly be wiped away. Edema of the lids and conjunctiva are seen as part of this hyperacute picture. The vast majority of neonatal conjunctivitis with this florid picture are not due to *Neisseria gonorrhoea* but are due to inclusion conjunctivitis or staphylococcus aureus.¹³ Clinically, the differential diagnosis between these can be made by noting the time of onset postpartum, as seen in (Table 2). Note that conjunctivitis secondary to silver nitrate occurs early and is mild.

Diagnosis

In all cases, a newborn presenting with conjunctivitis should have smears done for gram and geisma stain and the secretions cultured on chocolate agar in 5-10% CO₂, an environment which, according to our microbiologist, supports *Neisseria* as well as all other aerobic bacteria.¹⁴ Conjunctival epithelial scrapings should be a part of the study since *Neisseria gonorrhoea* organism often appear in epithelial scrapings prior to being seen in smears of exudates.¹⁰

Epidemiology

Since this is not a reportable disease, the exact incidence of ophthalmia neonatorum is not known.¹⁵ The children of young unwed mothers from poor economic backgrounds are known to have a higher risk of developing ophthalmia neonatorum.¹⁶ Premature rupture of the amniotic membrane also predisposes the baby's eyes to infection, secondary to prolonged exposure to the organisms. The most dangerous type of confinement for the fetus is a protracted labor with face presentation.¹⁷ When all, or many of these factors are present, the index of suspicion of gonococcal ophthalmia

should be high.

Pathology

Anatomical considerations in the newborn influence greatly the manifestation of ophthalmia neonatorum. The absence of lymphoid tissue, the absence of tears at birth, and the lack of immunity in the neonate allow for a greater severity of infection and a variance in the clinical characteristics as compared to the adult.¹⁷

Prophylaxis

There is a controversy as to whether prophylaxis against ophthalmia neonatorum should be performed¹⁸ or whether prompt adequate treatment should be instituted with the onset of the disease. The most widely used form of prophylaxis in this country is 1% silver nitrate instilled in the eyes; and alternate forms include topical or parenteral penicillin prior to the development of the disease.*

Those who advocate no prophylaxis believe that the prompt response of ophthalmia neonatorum to treatment alleviates the need for troublesome and sometimes distressing prophylaxis. They point out that the availability of effective antibiotics in developed countries tremendously decreases the chance of blindness due to untreated ophthalmia neonatorum. In Britain where prophylaxis is not required, there has been no report of blindness from this cause.¹⁹ The other arguments for the discontinuation of silver nitrate revolve around the occasional mild chemical conjunctivitis occasionally produced with the 1% solution, and the catastrophic occurrence of the accidental substitution of the stronger ammoniacal silver nitrate preparations (25 to 35 percent).²⁰ One should also not forget that silver nitrate does not always work, as seen in this report.

Those who advocate continuation of Credé prophylaxis point out that successful therapy depends upon accurate diagnosis and treatment of the disease at its onset. Presently, many infants and mothers are discharged from the hospital observation before the incubation period of dangerous organisms has passed. This coupled with the increasing incidence of asymptomatic gonorrhea in prenatal women²¹ and the present recognition of asymptomatic G.C. in men²² builds a strong case for the continuation of prophylaxis by the Credé silver nitrate methods. Recognition is also made of the fact that in some of the newer countries

*Penicillin is probably the most effective of the substitute forms of prophylaxis,²³ however, the fears of patient sensitization and/or the production of resistant bacteria may be well founded.

where adequate treatment is not available, silver nitrate has a place in preventing gonorrhea as a cause of blindness.

The current conclusion regarding prophylaxis is that although gonorrheal ophthalmia neonatorum can be successfully treated, most consultants

in this country recommend prophylaxis with 1% silver nitrate solution in wax ampules (to prevent water evaporation and concentration of the solution), with topical penicillin preparations as alternatives.²³

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Hennepin County Academy of Family Physicians

The Hennepin County Academy of Family Physicians' Annual Invitational Banquet will be held Thursday, November 15, 1973, at the Sheraton Ritz Hotel in downtown Minneapolis. A social hour at 6:00 P.M. with dinner scheduled at 7:30 P.M. The speaker will be Dr. Herb True, a multifaceted idea man and humorist, currently the senior lecturer for the American Management Association and the Presidents Association. Dr. True's presentations feature a rapid-fire staccato of provocative ideas. Physicians and their guests, both from the metropolitan and out-of-state areas, are invited. Contact: Alan K. Schultz, M.D., 5920 Kirkwood Circle, Minneapolis, Minnesota 55442, telephone 537-8853.

Minnesota Academy of Family Practice

Minnesota Academy of Family Practice announces it's Third Midwinter Seminar January 26th to February 2, 1974 in the Caribbean. Info; MAFP, 214 East Main, Waterville, Minnesota, 56096.

Clinical and Invasive Studies of Coronary Artery Disease*

One-Year Follow-up of 505 Patients

CHARLES R. PETERSON, M.D.†

MOST REPORTS CORRELATING coronary arteriographic findings with clinical diagnosis or prognosis do not compare patients selected for arteriography with similar patients who did not have arteriographic studies.¹⁻⁴ Comparative follow-up of patients who have arteriographic studies with larger groups of similar patients from which they were selected might provide additional information about the effective use of both non-invasive and invasive techniques.

This report reviews the selection of 133 patients for coronary arteriography from 505 patients consecutively evaluated for coronary artery disease.

Patients and Methods

The purpose of this study is to review the

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See editorial, page 968.

diagnosis and management of patients with known or suspected coronary disease by obtaining periodic morbidity and mortality data after prospective classification into diagnostic groups. Patients were evaluated and classified *prior to* arteriography. The accuracy of the clinical classification compared with the arteriographic and other findings obtained in those patients selected for invasive procedures.

Patient Selection and Classification

Five hundred and five patients under the age of 70 consecutively evaluated because of suspected or proven artery disease (CAD) were classified prospectively into various diagnostic groups on the basis of clinical evaluation. The average age of the 390 men was 52, and of the 115 women, 54 years. The diagnostic categories and description of the patients in each group are listed in Table 1. Patients with other significant cardiopulmonary conditions (valvular disease, emphysema, heart failure of unknown cause, etc.) and patients with peripheral occlusive vascular

TABLE 1

Diagnostic Classification: Coronary Artery Disease (CAD)

Group I. Doubtful CAD

- (A) NO CAD: Very atypical symptoms or findings; ECG normal or with minor, non-specific abnormality; negative exercise ECG.
- (B) POSSIBLE CAD: Atypical but suspicious symptoms; ECG normal or with non-specific abnormality; negative exercise ECG.

Group II. CAD—Asymptomatic or Class 2 Angina

Previous myocardial infarction, now asymptomatic; angina predominantly with exertion more than normal, non-strenuous daily activities (with or without previous infarction); angina stable, promptly relieved with rest; normal or abnormal exercise ECG; no evidence of heart failure or cardiomegaly.

Group III. CAD—Class 3 or 4 Angina

Frequent angina with normal, non-strenuous daily activities, usually requiring several nitroglycerin per day; rest or nocturnal angina; hospital admission for acute coronary insufficiency without infarction (even if usually Class 2 angina); normal or abnormal exercise ECG; no evidence of heart failure or cardiomegaly.

Group IV. CAD With Heart Failure

Previous documented myocardial infarction or typical angina with persistent cardiomegaly in spite of digitalis and diuretic therapy; usually Class 2-4 dyspnea with or without angina; may have significant papillary muscle dysfunction or ventricular aneurysm.

isease or hypertension without clinical evidence of CAD, were excluded.

The emphasis in this report is on those patients without significant cardiomegaly or heart failure (Groups I-III). Most of the patients in Groups I-III were evaluated for chest pain or abnormal electrocardiograms. An attempt was made to describe the symptoms as typical, suspicious, or atypical of angina pectoris. Patients with diagnosed CAD (previously documented myocardial infarction, abnormal exercise ECG, or typical angina pectoris) were divided into two groups according to the severity of symptoms. Most of the patients with Class three or four angina had a therapeutic trial with propranolol and long-acting nitrate drugs. This usually resulted in some improvement in symptoms but usually not enough to reclassify the patients as functional Class one or two. These drugs were discontinued 2 hours prior to arteriography and invasive hemodynamic measurements. Most of the patients were not receiving anticoagulant medication.

Sixty-five patients were seen initially because of acute myocardial infarction documented by acute ECG changes and enzyme rises. The 60 survivors were included in Groups II-IV on the basis of clinical evaluation three to six months later. These patients were advised to increase activity gradually to full days of nonstrenuous activity in three months. If asymptomatic at this time, they were encouraged to attempt gradual further increases in exercise or activities.

Exercise Electrocardiography

Exercise electrocardiography was performed on a patient-propelled or motorized treadmill. If the patient developed significant chest discomfort or telemetry ECG changes in less than five minutes, exercise was terminated. The exercise was increased after three minutes if a minimum heart rate of 140/minute was not achieved. The average heart rate was 71 before exercise, 143 peak rate during exercise, and 122 on the immediate post-exercise ECG. The test was considered abnormal if the S-T segment depression was one mm or more and the depressed segment was horizontal or sloping downward. If the control tracing had S-T or T abnormalities, two mm depression was required for an abnormal response. Equivocal changes were considered normal for the purpose of this report.

Indications for Coronary Arteriography

Patients with doubtful CAD (Group I) had

selective coronary arteriography performed only if an accurate diagnosis was considered important because of ominous but non-diagnostic symptoms, psychological considerations, or administrative reasons. Patients with definite but minimally asymptomatic CAD (Group II) had selective coronary arteriography recommended primarily because of young age (under 50), rare occasions of angina more severe or prolonged than usual, or other symptoms (such as syncope or nausea). Most patients with Class three-four angina (Group III) were advised to have selective coronary arteriography performed with the understanding that revascularization surgery should be considered. Selective coronary arteriography was performed by the percutaneous femoral approach in 90% and by trans-brachial in the remainder.

Physiological Studies

Measurement of rest and exercise left ventricular pressures at the time of coronary arteriography was employed only in the latter part of this series. Resting left ventricular end-diastolic pressure (LVEDP) was measured and average exercise LVEDP was measured during the first two respiratory cycles immediately after three minutes of exercise.

Individual LVEDP values were measured 0.04 second after the onset of the QRS of the ECG (0.06 second if left bundle branch block was present). The LVEDP values in this report were measured after selective coronary arteriography but before ventriculography. It is possible that better correlations may have been obtained had the measurements been made before arteriography, but the control patients were studied identically for comparison. A comparison of the change of LVEDP with exercise before and after arteriography in 12 patients showed no difference. Ten randomly selected patients also had cardiac output measurements to define the average hemodynamic change with exercise. The mean (± 1 SD) changes from rest to exercise were: heart rate increase from 78 ± 9 to 101 ± 10 ; oxygen consumption/min/M² increase from 135 ± 26 to 322 ± 82 ; cardiac index increase from 2.9 ± 0.4 to 4.1 ± 0.9 .

Invasive Data Classification

To permit diagnostic comparison with clinical Groups I-III, the patients who were studied by arteriography were classified into three groups on the basis of the number of the three main coronary systems which had greater than 50% narrowing

of at least one area of the proximal arterial segments (none, single, or multiple vessel disease). Greater than 35% occlusion of the left main coronary artery was considered multiple vessel CAD. Over 90% of the patients in Groups II and III had at least one vessel with greater than 75% narrowing. All patients had cine arteriograms and most of them also had serial or spot filming of both right and left coronary systems in at least two projections.

Those patients who had rest and exercise LVEDP measurement also were classified into three groups with exercise LVEDP increases of less than 5 mm Hg, 5-10 mm Hg, or greater than 10 mm Hg. This classification was based in part on the findings of a previous study.⁵ The average LVEDP values at rest prior to exercise for all three groups of patients were between 10 and 12 mm Hg.

Revascularization Surgery

Although the statistics of patients selected for arteriography or revascularization generally represent the criteria of the author, a number of patients refused recommendations for arteriography or surgery. During the period that patients entered the study, an increasing proportion of patients with Class three or four angina pectoris (Group III) accepted recommendations for revascularization surgery utilizing the reversed saphenous vein technique. This report has approximately equal numbers of patients in Group III treated with and without surgical revascularization, but strict comparison is not valid because of the small sample, the lack of random selection, and an average time delay of several months be-

tween evaluation and revascularization surgery (representing a period of medical treatment).

Follow-up Methods

Follow-up information was obtained by direct physician evaluation in about 40% of the patients and by mailed questionnaire or telephone in the remainder. The study is designed to obtain follow-up data one, three, and five years after initial evaluation and one-year follow-up has been 98% complete. Most of the patients lost to follow-up were from Group I.

Results

The number of patients in each of the diagnostic groups and subgroups is shown in Table 2. The percentage of patients with abnormal exercise ECG's, abnormal coronary arteriograms, and abnormal increases in exercise LVEDP measurements was greatest in the patients most symptomatic with angina pectoris (Group III). The more typical and severe the findings of coronary artery disease, the greater the percentage of patients who were studied by selective coronary arteriography (14% of group I, 21% of Group II, and 70% of Group III).

Selective coronary arteriography reversed the clinical diagnosis in five patients. Two patients had false negative clinical diagnoses of coronary artery disease (including normal rest and exercise electrocardiograms) reversed by arteriographic studies. Both were studied because of syncope of unknown cause.

Three false positive diagnoses of coronary artery disease reversed by selective coronary arteriography were in women with atypical symptom

TABLE 2
Clinical and Invasive Studies of Coronary Artery Disease (CAD):
505 Patients

Group	Diagnosis	Number of Patients	Exercise ECG		Coronary Angio	
			Normal	Abnormal	Normal	Abnormal
I	Doubtful CAD					
A	No CAD	158 (0)	129 (0)	.....	8 (0)	
B	Possible CAD	70 (1)	31 (0)	.....	21 (0)	2 (0)
II	CAD: Minimally Symptomatic					
A	Medical Treatment	158 (2)	30 (1)	20 (0)	3 (0)	29 (0)
B	Surgical Revasc.	2 (0)	1 (0)	1 (0)		2 (0)
III	CAD: Class 3-4 Angina Pectoris					
A	Medical Treatment	45 (9)	3 (0)	8 (4)	..	18 (7)
B	Surgical Revasc.	46 (5)	6 (0)	27 (2)	.....	46 (5)
IV	CAD: Heart Failure	26 (8)	.....	.....	.....	4 (1)
TOTALS		505 (25)	200 (1)	56 (6)	32 (0)	101 (13)

The numbers in parentheses indicate the number of deaths within one year of initial evaluation.

who had 1 mm ST depression on post-exercise ECG's. An additional patient not included in this series because of recent study with short follow-up had ECG and vector-cardiographic evidence of an old anterior myocardial infarction, but selective coronary arteriography demonstrated normal coronary arteries.

Risk Factors

Although the risk factors of family history, cigarette smoking, obesity, hypertension, diabetes, and hyperlipidemia increase the statistical likelihood of a patient having coronary artery disease,⁴ these factors alone were not considered enough to justify labeling a patient with this diagnosis in the absence of typical symptoms or specific ECG abnormalities. Many of the patients in Group I had one or more risk factors which constituted part of the reason for cardiac evaluation.

Table 3 lists the mean cholesterol and triglyceride values in those patients who had selective coronary arteriography. The mean values were highest in patients with coronary artery disease. However, the overlap of individual determinations was so great as to be of little help in diagnosis in an individual patient. The other risk factors, alone or in combination, were of equally limited value for this purpose.

TABLE 3

Mean Cholesterol and Triglyceride Values in Patients Studied by Selective Coronary Arteriography

	Age (years)	Cholesterol (mgm %)	Triglyceride (mgm %)
No CAD (32 patients)	50 ± 11	221 ± 50	187 ± 41
Single Vessel CAD (36 patients) p	50 ± 8 NSD	236 ± 45 NSD	205 ± 104 NSD
Multiple Vessel CAD (60 patients) p	54 ± 8 NSD	265 ± 59 <.001	211 ± 90 NSD

p = The probability of no significant difference (NSD) between the means (±1 SD) and the control group (No CAD).

Noninvasive vs Invasive Correlations

Table 4 displays the relationship of clinical diagnostic Groups I-III to the arteriographic findings in 133 patients. Many of the patients in Group I were studied because of the relatively young age at which coronary disease had been diagnosed and were found to have one occluded vessel related to a previous myocardial infarction with only minimal disease in the remaining coronary arteries. Seventy-three percent of the patients who had coronary artery disease but were minimally symptomatic (Group II) had single vessel coronary disease, and 85% of the patients with moderate or severe angina (Group III) had multiple vessel disease.

TABLE 4
Clinical vs Arteriographic Correlation: 133 Patients

	1 0 Vessel	2 1 Vessel	3 2-3 Vessel
I. No CAD	29	1	1
II. CAD: Mild Symptoms	3	27	7
III. Angina: Class 3-4		10	55

Groups I-III indicate clinical classification prior to selective coronary arteriography.

Groups 1-3 indicate arteriographic classification based upon the number of main coronary artery systems with greater than 50 percent narrowing of proximal segments.

Table 5 displays the relationship of the clinical groups of patients to the number of patients with different levels of LVEDP increase with exercise. The percentage of patients with a rise of LVEDP with exercise of greater than 4 mm Hg increased from 10% in Group I to 46% in Group II and 88% in Group III. Similarly, the percentage of patients with an exercise LVEDP rise greater than 10 mm Hg increased from five percent in Group I to 17% in Group II and 60% in Group III. Since the clinical grouping included some patients with false positive and false negative clinical diagnoses as determined by subsequent arteriography, slightly better correlations of exercise left ventricular dysfunction could be

TABLE 5
Clinical vs Exercise LVEDP
Correlations: 84 Patients

	1 <5 mm Hg	2 5-10 mm Hg	3 >10 mm Hg	Average LVEDP RISE
I. No CAD	18	1	1	2 ± 5
II. CAD: Mild Symptoms	13	7	4	5 ± 5 p = NSD
III. Angina: Class 3-4	5	10	25	13 ± 8 p = <.001

Groups I-III indicate clinical classification prior to coronary arteriography. LVEDP groups indicate the rise of left ventricular and end-diastolic pressure with supine exercise at the time of arteriographic studies.

p = probability of no significant difference (NSD) of the means (±1 SD) from the control group (I).

made with arteriographic rather than clinical groupings of patients.

These results indicate a relationship of the activity and circumstances that provoke angina with both the severity of arteriographically demonstrable CAD and physiological evidence of left ventricular dysfunction.

Morbidity and Mortality

Much of the follow-up information was obtained indirectly or by mailed questionnaire so the true incidence of myocardial infarction and true cause of death in some cases are not known. Accurate comparison of Group III to the other groups is not possible since about one-half of the patients in this group had revascularization surgery. Despite these limitations, information obtained by the first year follow-up survey is instructive. Table 2 lists the diagnostic groups with the number of deaths within one year indicated in parenthesis.

The one death which occurred in the group of 228 patients with doubtful CAD (Group I) was in a 57-year-old woman with left bundle branch block evaluated for abdominal discomfort of unknown cause. She died at home two months later, and there were no clues to the possible cause of death.

Two deaths occurred in the group of 160 patients with minimally symptomatic CAD (Group II). One patient was an asymptomatic 65-year-old man who had a myocardial infarction five years before and had a negative exercise ECG. He died suddenly at home eight months after evaluation. The other patient was a 50-year-old man who had an inferior myocardial infarction five years before and was asymptomatic. He had not had a recent exercise ECG. Engaged in an exercise program at a sports and health club, he collapsed suddenly on a treadmill and was dead on arrival at the hospital. Autopsy demonstrated an old occlusion of the right coronary artery and a fresh thrombus in the anterior descending coronary artery beginning at a small and minimally occluding atherosclerotic plaque.

There were nine deaths within one year in the group of 45 patients with moderate or severe angina who did not have revascularization surgery (Group III-A). Seven of these patients had been hospitalized for coronary insufficiency without myocardial infarction within six months of death, and seven of the nine patients had multiple vessel

CAD demonstrated by selective coronary arteriography. Coronary arteriography for consideration of possible revascularization surgery had been recommended to all nine patients.

In the 48 patients who had revascularization surgery, there were five deaths within one year (four hospital deaths following surgery and one late death). All but two patients had Class 3-4 angina pectoris at the time of surgery, and four patients had simultaneous resection of large area of akinetic myocardial scar. The average number of saphenous vein grafts per patient was 2.2. Five of six patients who had angiographic studies 13-24 months after surgery had patent revascularization vein grafts.

There were eight deaths within one year in the 26 patients with CAD and heart failure (Group IV). Only two patients from Groups I-III were known to develop heart failure or cardiomegaly within one year of initial evaluation and both patients were from Group III.

In the total study group there were 16 documented non-fatal myocardial infarctions within one year of the initial evaluation, and all 16 cases occurred in clinical Groups II, III, and IV. Five of the 158 patients (three percent) who were minimally symptomatic at the time of initial evaluation (Group II) had non-fatal myocardial infarctions within one year. Nine of the 45 patients (20%) who had Class 3-4 angina treated medically (Group III-A) had non-fatal myocardial infarctions within one year. One late, non-fatal myocardial infarction occurred in one of the patients who had revascularization surgery, and another myocardial infarction occurred in a patient with CAD and heart failure.

The known one-year morbidity and mortality statistics in this study indicate that the highest risk patients are those who are the most symptomatic with angina, have abnormal exercise ECG, and have multiple vessel coronary artery disease with greater than 50% occlusion demonstrated by selective coronary arteriography.

Discussion

In this series of 505 consecutive patients evaluated for suspicious or proven CAD, the clinical diagnosis was determined primarily by two non-invasive techniques: the history and the electrocardiogram. Other clinical and laboratory information, although considered important, was not decisive in classifying the patient into one of the

four categories.

Patients were selected for coronary arteriography primarily because of the nature and circumstances of symptoms. Most of the patients considered clinically to have doubtful or minimally symptomatic CAD had arteriography performed because there was some degree of psychological or administrative incapacitation, or because there were ominous but non-diagnostic symptoms that otherwise were unexplained. Most of the patients with Class 3-4 angina had arteriography because there was apparent symptomatic incapacitation or a recent change in symptoms suggestive of impending myocardial infarction. Consideration for possible revascularization surgery therefore was indicated.

There are reasons to be skeptical about the usefulness of a subjective interpretation of symptoms. Objective laboratory results usually are more reliable and reproducible, and combinations of multiple selected results can increase the probability of the presence of significant CAD.⁴ Other studies have demonstrated that the placebo effect of medical or surgical treatment makes the subjective evaluation of the relief of symptoms unreliable.⁶⁻⁸ However, it should not be assumed that an accurate description of symptoms is of equally limited value for diagnosis or prognosis, especially if the effects of current treatment on symptoms are considered. A patient with a high number of risk factors may be years away from a major coronary event, while a patient with typical severe angina may have greater imminent risk in spite of many normal noninvasive test results.

The results of this study suggest that a careful description and functional classification of symptoms may be the most important noninvasive means of determining imminent risk of CAD, should be a major consideration in selecting patients for diagnostic procedures, and may allow separation of patients with similar arteriographic findings into relatively high and low risk groups.

In the 228 patients in this study with doubtful CAD (Group I), there was one known death within one year of the initial evaluation, and the cause of death in this patient was not known. This patient was not included in the 31 patients in Group I who had selective coronary arteriography. However, it is unlikely that performing invasive procedures on all of these patients with atypical symptoms for consideration of revascularization surgery would prevent many deaths.

In the 203 patients with clinically proven CAD without significant heart failure or cardiomegaly who did not have revascularization surgery (Groups II-A and III-A), there were 11 deaths within one year (5.4%). This mortality rate is similar to that of other large series of similar patients.⁹⁻¹¹ By prospective clinical evaluation by noninvasive means, these 203 patients were divided into a minimally symptomatic group with a one-year death rate of 1.5% (Group II-A) and a significantly symptomatic group with a one-year death rate of 20% (Group III-A). Even considering the difficulties and the sometimes arbitrary nature of a subjective evaluation of symptoms, this suggests that symptoms alone should allow a clinical separation of patients with known or suspected CAD into two groups of less than five percent annual mortality and greater than 10% annual mortality. Although the selection of patients for selective coronary arteriography should always be individualized, Class 3-4 angina pectoris without diffuse myocardial failure should constitute a definite indication for selective coronary arteriography for consideration of possible revascularization surgery.

A negative exercise electrocardiogram does not exclude the diagnosis of coronary artery disease, but it helps place the patient in a low risk category, especially if symptoms are atypical or mild. Diagnostic and prognostic priority should be placed on symptoms if angina is typical and severe, even if an exercise electrocardiogram is normal. An abnormal exercise electrocardiogram favors a high risk situation. However, if the patient has minimal symptoms, close medical follow-up may be preferable to surgery, especially if arteriography is performed and demonstrates single vessel coronary artery disease.

The reversed saphenous vein revascularization can produce satisfactory relief of angina pectoris associated with demonstrated graft patency for at least a year in most cases.^{12,13} The ideal indications for surgery involve a number of technical and functional considerations that must be evaluated by invasive techniques.¹²⁻¹⁴ The long term morbidity and mortality are not yet known. Occlusive pathology of the vein graft, the anastomoses and the distal coronary arteries have been shown to compromise the results of surgery.¹⁴⁻¹⁶

To establish that revascularization surgery will affect the natural course of coronary artery disease favorably, it should be demonstrated in large

groups of patients that the mortality is significantly less than similar groups of patients which have been classified arteriographically. The annual mortality rate in previous reports varies from two to ten percent depending upon the number of coronary systems with significant narrowing.¹⁻²

The follow-up survey of all the patients in this study with arteriographically proven significant coronary artery disease who did not have revascularization surgery indicated a mortality within one year of 20%. Considered alone, this fact would appear to be enough to justify liberalizing the indications for arteriography and revascularization surgery. However, the mortality within one year in all patients with atypical or minimal symptoms without cardiomegaly (Groups I and II) was less than one percent. Furthermore, in the entire study group, all but one of the deaths which were known to have been due to coronary artery disease were identified as high risk by noninvasive techniques prior to death. The results of this study therefore do not justify the conclusion that most of the 505 patients should have been studied

arteriographically.

The severity of angina pectoris defined by frequency and provoking circumstances is a significant predictor of the pathophysiology and natural history of patients with chronic coronary artery disease. Patients with episodic angina at rest or frequent angina induced by normal, nonstrenuous daily activities have a much greater likelihood of multiple vessel coronary artery disease, exercise induced left ventricular dysfunction, and death or acute myocardial infarction within one year than do patients with atypical or minimal symptoms. A careful description of the severity of angina therefore is an important noninvasive means of identifying the high risk patient with coronary artery disease. The patients most symptomatic with angina may be most likely to benefit from revascularization surgery.

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Cerebrovascular Malformations in Hereditary Hemorrhagic Telangiectasia

BLANKA SCHAUMANN, Ph.D.* and MILTON ALTER, M.D., Ph.D.*

HEREDITARY HEMORRHAGIC telangiectasia (HHT) is an autosomal dominant disorder characterized by familial occurrence of multiple capillary and venous dilations (telangiectatic lesions) of the skin, mucous membranes and internal organs. The telangiectases are rare in childhood and become more frequent with advancing age. Recurrent bleeding may occur from these lesions. The most common manifestation is epistaxis and careful inspection of the nasal mucosa and mouth after adolescence usually reveals punctate telangiectatic lesions.

The expression of the disease is variable and many organ systems may be affected including the skin, eyes, lungs and gastrointestinal tract. There have also been reports of central nervous system (CNS) involvement, but most of them, unfortunately, have not been well documented. In spite of the scarcity of confirmed cases, vascular anomalies in the CNS may actually be quite common. Not infrequently, the patients and other members of their family are described as suffering from headaches (Goldstein, 1930;¹⁵ Campbell, 1944;⁶ Walton, 1953;²⁸ Smith, Bartholomew, and Cain, 1963;²⁵ Myles, Needham, and LeBlanc, 1970;²¹ paralysis (Hodgson, Burchell, Good, and Clagett, 1959;¹⁷ Myles *et al.*, 1970),²¹ vertigo, slurred speech (Michael and Levin, 1936),²⁰ "fits" (Hodgson *et al.*, 1959;¹⁷ Bloom and Moynahan, 1960),² convulsive seizures (Michael and Levin, 1936;²⁰ Williams and Flink, 1947),³⁰ personality changes (Walton, 1953),²⁸ "brain fever" with loss of speech and impaired hearing (Lawless, 1934),¹⁸ premature cerebrovascular accidents (Goldstein, 1921;¹⁴ Hodgson *et al.*, 1959),¹⁷ "meningeal bleeding" (Saunders, 1962),²⁴ "meningitis" (Myles *et al.*, 1970),²¹ "a ruptured blood vessel of the brain" (Cobb, 1915;³ Mekie, 1927;¹⁹ Goldstein, 1930),¹⁵ or a "brain tumor" (Michael and

Levin, 1936).²⁰ An abnormal EEG has also been reported (Bloom and Moynahan, 1960).²

A typical example of central nervous system involvement in the family of a patient with HHT is given by Walton (1953).²⁸ The patient suffered from occipital headache, generalized convulsions and spastic paraplegia. His mother had HHT. The maternal grandmother died from a "stroke" at age 32, a brother from epilepsy at 39, and a sister of cerebral hemorrhage after suffering epistaxis for several years.

The possibility that abnormal vessels in the brain were responsible for the neurological disturbances has been considered by some authors. Thus, Campbell (1944)⁶ suggested that intracerebral telangiectasis might have caused the migrainous attacks in one of his patients with HHT. Bloom and Moynahan (1960)² thought that a hemorrhage from abnormal intracranial vessels might have explained the fits in two members of a family with HHT. A case of HHT with a cerebral hemorrhage resulting in hemiplegia was described by Goldstein.^{14,15} Also Myles *et al.* (1970)²¹ described a family with transient neurologic symptoms and considered the possibility of bleeding from cerebral telangiectases as the cause of the alternating hemiparesis in their patient.

Only a few articles described the central nervous system in HHT in sufficient detail to determine the type of vascular pathology present. Most of these reports describe capillary telangiectases of the brain (Michael and Levin, 1936;²⁰ Werner, 1942;²⁹ Snyder and Doan, 1944;²⁶ Ytrehus, 1948;³¹ Brinkmann, 1950;⁵ Vischer, 1951;²⁷ Zelman, 1962;³² Heffner and Solitare, 1969)¹⁶ but it is not always clear where the lesions are within the brain substance or leptomeninges.

Larger cerebral vascular malformations in HHT have also been recognized. In an autopsy of a Negro man with bifrontal headaches and convulsions, Heffner and Solitare (1969)¹⁶ found several telangiectatic lesions on the cut surface of

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the brain. The largest of them, which measured 40 mm in greatest dimension, was in the right frontal lobe and involved both the gray and white matter. Similar telangiectases were seen in the pons and cerebellum. Cohn and Rosenthal (1948)⁹ described a case of HHT with a venous angiomatous malformation of the spinal cord disclosed at operation. Quickel and Whaley's (1967)²² patient suffered from severe frontal headaches and was found to have had a subarachnoid hemorrhage. Arteriography revealed a capillary angioma in the left caudate nucleus. Courville (1957)¹⁰ reported clusters of enlarged and tortuous veins and telangiectatic lesions in the leptomeninges on microscopic study. The autopsy of Bird and Jaques' (1959)¹ case showed thin-walled veins. The malformation spread widely in the white matter but was particularly concentrated in the subcortical areas. Reagan and Bloom (1971)²³ presented another case with multiple venous angiomas of the left cerebrum found on autopsy of a patient with HHT and seizures. A large venous temporo-parietal angioma was detected angiographically in the brain of a patient described by Giampalmo, Badini, and Buffa (1971).¹³

Only three reports record larger arteriovenous (AV) malformations of the CNS in HHT. Boczko (1964)³ described a patient who, several years after surgery for multiple pulmonary AV malformations, was discovered to have an AV malformation in the left cerebral hemisphere. The angiogram showed a cluster of small vessels, 10-15 mm in greatest diameter, in the anterior parietal area. The neurological symptoms included a convulsive seizure associated with loss of consciousness of unknown duration and followed by numbness and transient right hemiparesis. Chandler's (1965)⁷ patient suffered from severe headaches, seizures and transient losses of consciousness and was found to have a large AV fistula, "the size of a thumb," involving the vein of Trolard. Czernobilsky and Bouzarth (1965)¹¹ reported a patient with frontal headaches, nuchal rigidity, diplopia and the right facial hyperaesthesia. At autopsy, a subarachnoid hemorrhage was found over the right frontal, parietal, and temporal lobes, the base of the brain and the cerebellum. The cerebral vascular malformations consisted of a ruptured aneurysm of the circle of Willis at the junction of the right internal carotid and middle cerebral arteries and an arteriovenous angioma in the mid-

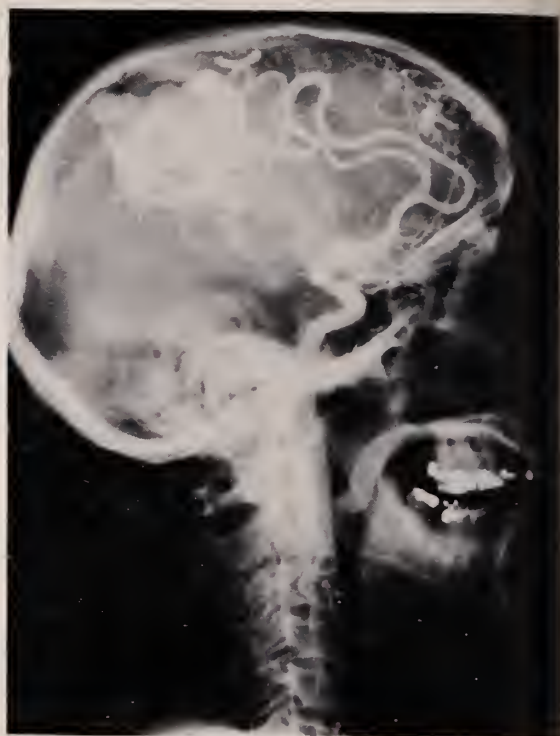


Fig. 1—A lateral angiogram illustrating a large arteriovenous malformation in the left fronto-parietal area of a 46-year-old man with hereditary hemorrhagic telangiectasia.



Fig. 2—An anteroposterior view of the same patient.

brain. There was histologic evidence of recent hemorrhage in the surrounding brain tissue.

Recently, a possible fourth case of a cerebral AV malformation in HHT has been reported (Boynton and Morgan, 1973).⁴ The patient was a female infant with a family history of HHT in several consecutive generations. The patient's father had an angiomatous malformation surgically removed from the spinal cord. The child died in progressive congestive heart failure attributed to a large AV malformation involving the quadrigeminal region of the brain stem. There were no telangiectases on postmortem examination. Since telangiectases usually become apparent only after puberty, failure to detect them at autopsy in this infant did not preclude the diagnosis of HHT.

In view of these reports, it is clear that the genetic defect which results in abnormal formation of vessels in HHT does not spare the CNS. The comparative rarity of documented reports of CNS involvement, however, prompted us to report our experience. Our case represents only the fourth or possibly the fifth documented example of a large vascular malformation in the CNS associated with HHT.

Case Report

A 46-year-old male truck driver was admitted to the Minneapolis Veterans Administration Hospital with a history of focal seizures. When he was 11 years old, he had a head injury and seizures developed thereafter. The seizures started with spasms in the right foot, ascended to the leg and thence to the chin, being followed by loss of consciousness. As a child he had frequent nose bleeds. Several relatives in four consecutive generations also had frequent epistaxis and some had gastrointestinal bleeding. Small blood vessel tumors had been observed on the lips of the family members with a tendency to epistaxis.

On auscultation of the skull, a bruit was audible over the left parietal area. Punctate vascular lesions were noted on the lips, buccal mucosa and tongue. The chest, heart and abdomen were normal. There was a moderate decrease in muscle strength on the right, a right Babinski sign and left-right confusion.

A hemogram, urinalysis and electrocardiogram were normal. X-rays of the chest, upper gastrointestinal tract and an intravenous pyelogram were normal but an X-ray of the skull showed a large, calcified left parietal mass. The electroencephalogram was normal. Bilateral carotid angiograms revealed a large cavernous hemangioma in the left parietal area with smaller hemangiomas in the right frontal area. The hemangioma was fed by vessels from both sides of the head. Intelligence measured by the Wechsler Adult Intelligence Scale showed an IQ of 82. Surgery for the hemangioma was declined.

The patient was treated with diphenylhydantoin and mephobarbital with good control of seizures.

He was readmitted to hospital six years later because of increasing difficulty in walking and an increase in seizures. He had deteriorated mentally in the interim and appeared thinner. Bruits were present over both carotid arteries as well as in the left temporal area. Small capillary hemangiomas were noted on the tongue, lips and buccal mucous membranes. They were also present on the trunk. He had a spastic right hemiparesis with right hyperreflexia. Sensation was normal.

A shift of the midline structures was seen on the echoencephalogram. A four-vessel angiogram showed a large AV malformation in the left frontal-parietal area (Figures 1 and 2). It took approximately five seconds from arterial to venous filling. The major feeding vessels included the posterior fronto-parietal branch of the left middle cerebral artery, both anterior cerebral arteries and a parieto-occipital branch of the left posterior cerebral artery. A smaller AV malformation was noted in the right frontal pole supplied by the callosal-marginal branch of the anterior cerebral artery. The electroencephalogram showed a grade 1 abnormality with delta showing in the left parietal area.

The anticonvulsant medication was adjusted and he became free of seizures. Because of the size of the malformation and its extensive network of feeding vessels, he was not thought to be a good surgical risk and he was discharged to a nursing home.

Discussion

The paucity of reports of vascular malformations in the CNS in HHT may be attributed to several factors. Larger anomalous lesions of the brain may, in fact, be rare in HHT (Courville, 1957).¹⁰ Clinical and neuropathologic evidence suggests that telangiectases in the CNS are usually silent (Boczko, 1964)³ and therefore may not draw any attention to their presence in living individuals. In a number of autopsies performed in instances of HHT, the brain is not examined. In others, the examination of the brain is very cursory and limited to gross inspection. Neurological manifestations may also be attributed to complications of pulmonary AV malformations (Dyer, 1967).¹² Although many patients with HHT have symptoms referable to the CNS such as headaches, convulsive disorders, loss of consciousness, mental confusion and premature strokes, cerebral angiography is apparently rarely performed. Whether neurological symptoms in a given patient with HHT are due to a cerebral vascular malformation can be determined by appropriate contrast studies and a high order of suspicion is warranted. Earlier recognition of such malformations may make surgical treatment feasible.

Summary

Neurological symptoms in hereditary hemorrhagic telangiectasia (HHT) are not unusual but the presence of a vascular malformation involving the nervous system has been documented in only a few cases. The majority have been reported in the last decade suggesting that neurological in-

volvement in HHT is now being recognized more often and may be more common than is implied by the few published reports. An additional patient with HHT is presented in whom a large vascular malformation of the brain was demonstrated. The literature on HHT with confirmed cerebral vascular lesions is reviewed.

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Medical Student

Robert J. Ingli, a second year student at the University of Minnesota Medical School, received an award of a \$160 set of illustrated medical texts for community service from the CIBA Pharmaceutical Company.

Ingli was nominated by his classmates for his involvement in several community health projects including a free clinic, Youth Emergency Service, and the Big Brothers Organization.

Fibromuscular Dysplasia of the Renal Arteries and Coarctation of the Aorta

Report in a Family

RONALD OLIN, M.D.* and CLIF S. HAMILTON, JR., M.D.*

ABOUT FIVE TO TEN PERCENT of hypertension cases are secondary in etiology. We have recently had the opportunity of seeing a mother and son both with secondary hypertension. The mother had fibromuscular dysplasia of the renal arteries and the son, coarctation of the aorta. Both had their hypertension relieved surgically.

We have been unable to find any similar reports of this combination in a family and whether the two conditions are related is unknown. This report presents these two cases and comments briefly on family history, histopathologic similarities and mechanisms of hypertension.

Case Reports

Case 1

A 35-year-old Caucasian housewife was first seen in January, 1971, with hypertension of four years' duration which was never adequately controlled with medication. Her mother was known to have hypertension and taking medication. Symptoms included morning occipital headaches and fatigue. On examination, the blood pressure averaged 190/116; there was a group 2 fundus, an aorticjection murmur, and bilateral, high-pitched continuous bruits in both upper quadrants of the abdomen. A renal arteriogram (Figure 1) showed bilateral fibromuscular dysplasia. There was a "string of beads" measuring 4 to 5 cms. in length in the right mid main renal artery. On the left, there was a localized 1.5 to 2 cms. area of constriction just beyond the bifurcation. Renal vein catheterizations for differential renin assays revealed 900 ng.% angiotensin from the right side, 500 ng.% angiotensin from the left side and 450 ng.% angiotensin from the inferior vena cava. Accordingly, an aortograft renal artery bypass vein graft was performed. Follow-up examinations have shown that she has remained normotensive without medication from the time of surgery to the last follow-up on July 20, 1972, when the blood pressure was 134/88.

Case 2

Her 10-year-old son was seen in March, 1972, with the history of abdominal pain when running hard. Ex-

amination revealed a blood pressure in the left arm of 162/74 and in the right arm 158/64. Other findings included visible pulsations and bruits over the scapulae, a loud precordial systolic murmur and no palpable pulses in the abdominal aorta, femoral, popliteal or



Fig. 1—Renal arteriogram of the mother showing bilateral fibromuscular dysplasia.

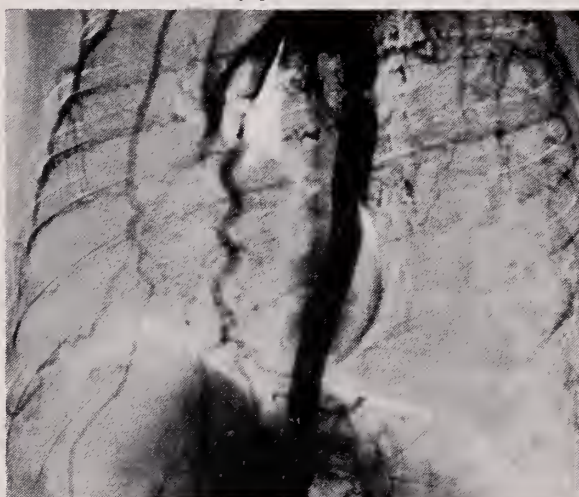


Fig. 2—Aortogram of the son showing area of coarctation distal to the left subclavian artery and collateral circulation.

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See editorial, page 967.

pedal arteries. Blood pressure was unobtainable in the legs. An aortogram (Figure 2) showed a coarctation of the thoracic aorta 2 cm. beyond the origin of the dilated left subclavian artery. There was collateral flow from the intercostals and internal mammary arteries bilaterally. At least two aortic valve leaflets were noted but there was uncertainty about the third. Surgery was performed with resection of the coarctation and an end-to-end anastomosis of the aorta. The pathologic specimen consisted of the area of coarctation 1 cm. in length. The 5 mm. in diameter lumen narrowed to 2 mm. in diameter in its mid portion. On microscopic examination there was typical hypertrophy and infolding of the aortic media. Postoperatively, there were good pulsations in the abdominal aorta and arteries of the lower extremities. On dismissal, the blood pressure was 126/70.

Discussion

Coarctation of the Aorta

This accounts for much less than 1% of all hypertension cases. It is twice as common in males than females and results from an abnormal obliteration of the aorta during regression of the multiple aortic arch system of the embryo. There does not appear to be any familial tendency. Classification is based largely on the site of coarctation in relation to the ductus arteriosus (preductal and postductal) and upon the age of death (infantile and adult). The adult, postductal type consists of an area of localized stricture on the superior, anterior and posterior aspects of the thoracic aorta beyond the origin of the left subclavian artery.

Longitudinal sections through the zone of coarctation reveal that the basic cause of the stricture is a curtain-like infolding of the aortic media.¹ This thickening projects into the lumen, making it narrow and eccentric. It is composed largely of collagen laid down in concentric layers with varying amounts of elastic tissue in the deeper portions. With time, there is also a secondary intimal thickening over the curtain of hypertrophied media.

There are two theories concerning the mechanism of the hypertension in coarctation of the aorta: (1) A mechanical origin in which the resistance of the coarctation is the important factor and (2) a renal basis in which a "renal vasopressor system" is activated in a manner similar to the hypertension of renal artery stenosis. Although earlier studies indicated a decreased blood flow to the kidneys in patients with coarctation of the aorta, recent studies have shown no significant hemodynamic abnormality.² Habib and Nanson³ in a series of experiments using dogs

transplanted both kidneys into the neck and noted the effect on the blood pressure before and after resection of the coarctation. Their results indicated that both mechanical and renal causes were operative at the same time to account for the hypertension. Amsterdam and coworkers⁴ measured peripheral plasma renin activity in 16 children, aged two to 13 years, with coarctation of the aorta and in controls and found no significant difference between the two groups. Seven patients with coarctation of the aorta had angiotensin infusion tests which were all negative. Their findings suggested that the hypertension of coarctation of the aorta was not associated with activation of the renin-angiotensin system although it might still be renal in origin. It was also possible that the kidney renin secretion was elevated to a degree that produced hypertension but could not be detected in the peripheral blood.

Renovascular Hypertension

This accounts for five to 25 percent of hypertension cases. It is primarily due to atheromatous disease or fibromuscular dysplasia. Fibromuscular dysplasia with secondary hypertension can occur in childhood⁵ but is more commonly seen in females between the ages of 20 and 45 years. Patients with fibromuscular dysplasia have a family history of hypertension significantly less often than patients with essential hypertension (45% compared to 70%).⁶ Familial factors in renovascular hypertension have not been further defined but Hunt⁷ has informed us that he has seen several patients with hypertension secondary to fibromuscular dysplasia of the renal arteries who have close relatives with hypertension secondary to atheromatous disease of the renal arteries. He has also seen a pair of female siblings with renovascular hypertension secondary to fibromuscular dysplasia, both of whom had their hypertension relieved surgically.

Fibromuscular dysplasia of the renal arteries includes three types of dysplastic lesions:⁸ (1) intimal fibroplasia, (2) medial fibromuscular dysplasia; four types, of which medial fibroplasia with mural aneurysms accounts for 60 to 70 percent of all dysplastic lesions; these medial lesions may be focal, multifocal or tubular stenoses with or without aneurysms and (3) adventitial or perivascular fibroplasia. Medial fibroplasia with mural aneurysms produces the typical "string of

heads" arteriogram as demonstrated in the right renal artery of the mother. Longitudinal sections through this lesion reveal multifocal stenoses due to thickened fibrous ridges alternating with areas of marked mural thinning (aneurysms). In the ridges, the arterial muscle is partly or completely replaced by fibroplasia with loose collagen replacing zones of degenerated elastic fibers within the media.

Whether these three types of dysplastic lesions are interrelated through changes from one form to another is unknown. Moreover, the exact cause of these lesions is unknown. It is theorized that they are probably congenital in origin⁹ or from traction injury to the media.

Of interest is that in 1 to 2 percent of cases of fibromuscular dysplasia of the renal arteries, similar lesions occur in other muscular branches of the aorta, commonly the cerebral arteries. In addition, the counterpart of intimal fibroplasia may be responsible for pulseless disease of the brain and upper extremities. However, the beaded arteriogram typical of medial fibroplasia with mural aneurysms has not been demonstrated radiographically or pathologically in cases of coarctation of the aorta. Certainly the focal area of

fibromuscular dysplasia in the left renal artery of the mother resembles radiographically the coarctation of the aorta in the son.

The mechanism of the hypertension in renal artery stenoses appears to be vasoconstriction and sodium and water retention effected by the renin-angiotensin-aldosterone system.¹⁰ A significant proportion of patients with renovascular hypertension have increased renin production as evidenced by renal vein and peripheral plasma activity and refractoriness to the pressor response of angiotensin-infusion tests.

Summary

Case reports of secondary hypertension in a mother and son due to fibromuscular dysplasia of the renal arteries and coarctation of the aorta, respectively, are presented. Whether the two conditions are related is unknown. Both conditions are similar in being congenital in origin, histopathologic abnormalities of the arterial media and having a renal mechanism causing the hypertension. The renin-angiotensin-aldosterone system is activated in the hypertension of renal artery stenosis whereas it does not appear to be associated with the hypertension of coarctation of the aorta.

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But man, proud man,

Drest in a little brief authority,

Most ignorant of what he's most assured,

His glassy essence, like an angry ape,

Plays such fantastic tricks before high heaven

As make the angels weep.*

*Shakespeare: *Measure for Measure*, II.ii.117-122.

Concurrent Lymphocytic Lymphoma and Infectious Mononucleosis

RAYMOND B. WEISS, M.D.* and B. J. KENNEDY, M.D.†

INFECTIONOUS MONONUCLEOSIS is a self-limited disease characterized by fever, sore throat, lymphadenopathy, and splenomegaly. In clinically atypical cases, diagnostic confusion between infectious mononucleosis and malignant lymphoma can occur, especially if the serological findings are equivocal.^{1,2} Patients with acute leukemia and concurrent infectious mononucleosis^{3,4,5} and patients with Hodgkin's disease and concurrent infectious mononucleosis^{6,7} have been reported. In our clinic a patient with lymphocytic lymphoma developed concurrent infectious mononucleosis, the latter disease causing temporary confusion regarding the clinical manifestations of the former.

Case Report

A 26-year-old man was well until 1959 when at the age of 13 noted an enlarged right anterior cervical node. There were no systemic symptoms of lymphoma. Biopsy of the node revealed replacement of the normal node architecture by sheets of well-differentiated lymphocytes. On current review of this biopsy slide a diagnosis of diffuse, well-differentiated lymphocytic lymphoma was made. He was treated with 2400 r to the right cervical and supraclavicular areas.

In 1961 he again developed right anterior cervical lymphadenopathy, but a second biopsy revealed only benign hyperplasia. Current review of the slide confirmed this diagnosis.

In 1962 lymphadenopathy occurred in the left anterior cervical chain. Biopsy of that node was interpreted as Hodgkin's disease. Current review of the tissue confirms the same lymphoma pathology as in 1959. He was administered an unknown dose of radiation to the left cervical area.

Three years later the patient was examined at the University of Minnesota Hospitals and was noted to have two mildly enlarged right cervical nodes, a left anterior cervical node, and a palpable spleen tip. A chest X-ray showed enlarged right hilar and paratracheal nodes. No treatment was administered and follow-up during the

next two years revealed no change in the adenopathy or splenomegaly.

In 1967 he was noted to have an enlarging spleen and new node masses in the groin, but no systemic symptoms. He was given a four-day course of nitrogen mustard, 0.1 mg per kg per day, and the inguinal node disappeared. For the next two years he remained well but continued to have mild splenomegaly. Chest X-rays were normal and showed no hilar adenopathy.

In 1969 the patient had abdominal pain and diarrhea. Gastrointestinal X-rays were normal, but a lymphangiogram showed several abnormal iliac nodes. 2500 r was administered to the periaortic nodes.

About six months later two right axillary nodes became enlarged; the spleen was not palpable. Again there were no constitutional symptoms and no treatment was given. A year later in 1971 the right axillary nodes were still enlarged and the spleen became palpable again.

In March 1972 three firm right axillary nodes, the spleen, and a vague right abdomino-inguinal mass were palpable. The lymphoma was considered to be slow progressing, but no therapy was given.

Two months later the patient had the onset of spiking fever, chills, sweats, anorexia, general malaise, and painful enlarged inguinal nodes. A three day episode of sore throat had occurred several weeks before the onset of the fever. There was no known exposure to an infectious disease. On physical examination three right axillary nodes (the largest being 3 x 4 cm) and two cm right inguinal nodes were palpable. The spleen tip was 5 cm below the costal margin. The temperature varied from 99.6 to 102° F.

A chest X-ray and intravenous pyelogram were negative. A bone marrow aspiration and biopsy and heterophile agglutination test were done. The white blood count was 7,400 with 53% neutrophils and 39% lymphocytes. The patient was regarded as having recurrent lymphoma, and he was begun on combination chemotherapy.

TABLE
Results of the heterophile antibody titers determined at intervals beginning two weeks after the onset of constitutional symptoms in May, 1972

Date	Presumptive Heterophile Titer	After guinea pig kidney absorption
6/6/72	1:320	*
6/16/72	1:112	1:28
6/30/72	1:14	0
7/14/72	0	

*Bacto-Heterol slide test (Difco Laboratories, Detroit, Michigan) confirmed infectious mononucleosis.

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†Section of Medical Oncology, Department of Medicine, University of Minnesota School of Medicine, Minneapolis.

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Reprint requests to Dr. B. J. Kennedy.

Five days later the heterophile test was reported as positive in a 1:320 titer with differential absorption confirming infectious mononucleosis (Table). Study of the marrow and peripheral blood showed numerous Downey cells, types I, II, and III. The drugs were immediately stopped. There was no further fever, and the splenomegaly had disappeared. The inguinal nodes had decreased in size, but remained palpable while the enlarged axillary nodes were unchanged. Over five weeks the heterophile test reverted to zero (Table).

It was apparent that the patient's symptoms were probably the result of a concurrent episode of infectious mononucleosis, and it was considered necessary to verify the presence of lymphoma. Axillary node biopsy revealed the same lymphoma process as previously. The inguinal nodes showed only benign hyperplasia. Ten months after the onset of infectious mononucleosis, the patient feels entirely well and is not receiving any therapy.

Discussion

This patient had three lymph node biopsies which confirmed the presence of diffuse, well-differentiated lymphocytic lymphoma. The presence of fever, lymphadenopathy, splenomegaly, and Downey cells in the blood with a high heterophile titer which on differential absorption confirmed infectious mononucleosis were conclusive evidence that this patient's illness was infectious mononucleosis. There is no question that the patient had two diseases and that he did not have false serological evidence of infectious mononucleosis as has previously been reported to occasionally occur with lymphoma.¹

In patients with fever, lymphadenopathy, splenomegaly, and equivocal serological findings, confusion has existed as to whether lymphoma or infectious mononucleosis is the proper diagnosis.^{1,2} Only clinical follow-up and precise pathologic interpretation have elicited the true diagnosis.

Although well-documented cases have been reported of concurrent leukemia and infectious mononucleosis and concurrent Hodgkin's disease and infectious mononucleosis, no previous reports were found of definite concurrent lymphocytic lymphoma and infectious mononucleosis. Price and Davis⁸ reported a patient who had well-documented lymphosarcoma with a positive Paul-Bunnell test. Clinically it was at first suspected

that the patient had infectious mononucleosis, but she very soon died and was found at autopsy to have a widespread lymphosarcoma. The authors felt that the patient had only lymphosarcoma with a positive Paul-Bunnell test, and not two concurrent diseases.

Soots⁹ patient had a clinical illness suggestive of infectious mononucleosis with a positive Paul-Bunnell test and eight weeks later was proven by node biopsy to have lymphosarcoma. It is difficult to determine whether this case represented two concurrent diseases or just lymphosarcoma with a positive Paul-Bunnell test.

It has been established that the Epstein-Barr (E-B) virus is related to, and probably the cause of, infectious mononucleosis as patients with infectious mononucleosis regularly develop antibodies to the E-B virus which persist for many years.¹⁰ The E-B virus has also been implicated in the etiology of Burkitt's lymphoma,¹¹ but currently definite proof is lacking.

Elevated antibody titers to E-B virus have been found by Levine et al. in Hodgkin's disease when compared to normal controls.¹² Cells indistinguishable from the Reed-Sternberg cell of Hodgkin's disease have been described in patients with clinically-proven infectious mononucleosis,^{13,14} and Hodgkin's disease patients have been reported with a precedent history of infectious mononucleosis.¹⁵ On the basis of this evidence and the elevated E-B virus antibody titers, it has been suggested¹² that the E-B virus may play some role in the etiology of Hodgkin's disease. No such role of E-B virus in the etiology of non-Hodgkin's lymphoma has been suggested, however. It is thus considered that the concurrence of these two diseases in our patient is probably coincidental, especially since it seems to be such a rare occurrence.

This patient's clinical illness was indistinguishable from relapse of his well-documented and long-standing lymphoma. Since combination cytotoxic chemotherapy is not the treatment of choice for infectious mononucleosis, it behooves one to rule out the concurrent presence of this disease when apparent reactivation of a previously-diagnosed lymphoma occurs.

References 1-15 will be found on page 960.

What are you doing with your Alcoholic Patient?

IF YOU ARE like most Physicians, you are not doing much! Traditionally we sew up his cut, cast his fracture, give him tranquilizers and send him away.

This traditional non "treatment" of the disease, but rather treatment of the symptoms of alcoholism stems from a number of factors:

1. The average doctor receives less than two hours training in four years of Medical School on the Number Three Illness.
2. Doctors are not exposed to successful treatment programs.
3. Doctors do not accept the disease concept of this illness.

Alcoholism is a treatable illness.

Alcoholism is a disease with physical, psychologic and social components as defined by the AMA, WHO and other medical groups. Emphasis has changed from punishment to treatment.

Insurance companies have accepted alcoholism as a disease. Most alcoholics are admitted to Hospitals under diagnosis other than Alcoholism and the true problem is not treated.

In Minnesota there are now many private and public treatment programs located in Private and State Hospitals.

Treatment programs provide for detoxification, counseling, group therapy, family counseling, psychologic testing and lectures. Follow-up care is emphasized using hospital and AA programs.

Physicians who are not interested in treating Alcoholics, should get the patient into the hands of someone who is. A list of treatment centers is given. Physicians interested in treatment are often gratified. Patients are frequently bright interesting individuals who have lost control of their lives to Alcohol. Interest in the patient by the physician is quickly perceived.

Doctors must treat or refer alcoholics if we are to make progress on this epidemic illness. There are at least 75,000 undiagnosed, seriously ill, untreated alcoholics in Minnesota. Would we allow this situation to exist with any other disease?

Thomas G. Briggs, M.D. DABFP
Medical Director St. John's
Hospital Alcohol Treatment
and Rehabilitation Unit, St. Paul
Member, Subcommittee on Alcoholic
and Drug Abuse MSMA

Lymphoma and Infectious Mononucleosis—Weiss and Kennedy (page 959).

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The irritations of man's day are often reflected in his gut.

The causes of irritable colon and the diarrheal symptoms that often accompany it can be as diverse as the systemic and emotional irritations man is faced with daily.

Although the mucoid nature of stools and the occurrence of diarrheal episodes coincident with times of emotional stress may be valuable clues to the functional nature of the disorder, irritable colon must often be diagnosed by exclusion. Such diagnostic exploration takes time. Discovery of the nature of any emotional problems may take more. During that time, Lomotil® is an ideal agent for controlling diarrheal symptoms.

Lomotil tablets are small, easy to carry and easy to take. They act promptly and effectively. Secondary effects are relatively infrequent and, once the first force of the diarrhea is controlled, maintenance is frequently effective on as little as one fourth of the initial dosage.

These same characteristics make Lomotil useful in controlling the diarrhea associated with gastroenteritis, antibiotic therapy and acute infections.



IMPORTANT INFORMATION: This is a Schedule V substance by Federal law; diphenoxylate HCl is chemically related to meperidine. In case of overdosage or individual hypersensitivity, reactions similar to those after meperidine or morphine overdosage may occur; treatment is similar to that for meperidine or morphine intoxication (prolonged and careful monitoring). Respiratory depression may recur in spite of an initial response to Nalline® (nalorphine HCl) or may be evidenced as late as 30 hours after ingestion. LOMOTIL IS NOT AN INNOCUOUS DRUG AND DOSAGE RECOMMENDATIONS SHOULD BE STRICTLY ADHERED TO, ESPECIALLY IN CHILDREN. THIS MEDICATION SHOULD BE KEPT OUT OF REACH OF CHILDREN.

Indications: Lomotil is effective as adjunctive therapy in the management of diarrhea.

Contraindications: In children less than 2 years, due to the decreased safety margin in younger age groups, and in patients who are jaundiced or hypersensitive to diphenoxylate HCl or atropine.

Warnings: Use with caution in young children, because of variable response, and with extreme caution in patients with cirrhosis and other advanced hepatic disease or abnormal liver function tests, because of possible hepatic coma. Diphenoxylate HCl may potentiate the action of barbiturates, tranquilizers and alcohol. In theory, the concurrent use with monoamine oxidase inhibitors could precipitate hypertensive crisis.

Usage in pregnancy: Weigh the potential benefits against possible risks before using during pregnancy, lactation or in women of childbearing age. Diphenoxylate HCl and atropine are secreted in the breast milk of nursing mothers.

Precautions: Addiction (dependency) to diphenoxylate HCl is theoretically possible at high dosage. Do not exceed recommended dosages. Administer with caution to patients receiving addicting drugs or known to be addiction prone or having a history of drug abuse. The subtherapeutic amount of atropine is added to discourage deliberate overdosage; strictly observe contraindications, warnings and precautions for atropine; use with caution in children since signs of atropinism may occur even with the recommended dosage.

Adverse reactions: Atropine effects include dryness of skin and mucous membranes, flushing and urinary retention. Other side effects with Lomotil include nausea, sedation, vomiting, swelling of the gums, abdominal discomfort, respiratory depression, numbness of the extremities, headache, dizziness, depression, malaise, drowsiness, coma, lethargy, anorexia, restlessness, euphoria, pruritus, angioneurotic edema, giant urticaria and paralytic ileus.

Dosage and administration: Lomotil is contraindicated in children less than 2 years old. Use only Lomotil liquid for children 2 to 12 years old. For ages 2 to 5 years, 4 ml. (2 mg.) t.i.d.; 5 to 8 years, 4 ml. (2 mg.) q.i.d.; 8 to 12 years, 4 ml. (2 mg.) 5 times daily; adults, two tablets (5 mg.) t.i.d. to two tablets (5 mg.) q.i.d. or two regular teaspoonfuls (10 ml., 5 mg.) q.i.d. Maintenance dosage may be as low as one fourth of the initial dosage. Make downward dosage adjustment as soon as initial symptoms are controlled.

Overdosage: Keep the medication out of the reach of children since accidental overdosage may cause severe, even fatal, respiratory depression. Signs of overdosage include flushing, lethargy or coma, hypotonic reflexes, nystagmus, pinpoint pupils, tachycardia and respiratory depression which may occur 12 to 30 hours after overdose. Evacuate stomach by lavage, establish a patent airway and, when necessary, assist respiration mechanically. Use a narcotic antagonist in severe respiratory depression. Observation should extend over at least 48 hours.

Dosage forms: Tablets, 2.5 mg. of diphenoxylate HCl with 0.025 mg. of atropine sulfate. Liquid, 2.5 mg. of diphenoxylate HCl and 0.025 mg. of atropine sulfate per 5 ml. A plastic dropper calibrated in increments of ½ ml. (total capacity, 2 ml.) accompanies each 2-oz. bottle of Lomotil liquid.

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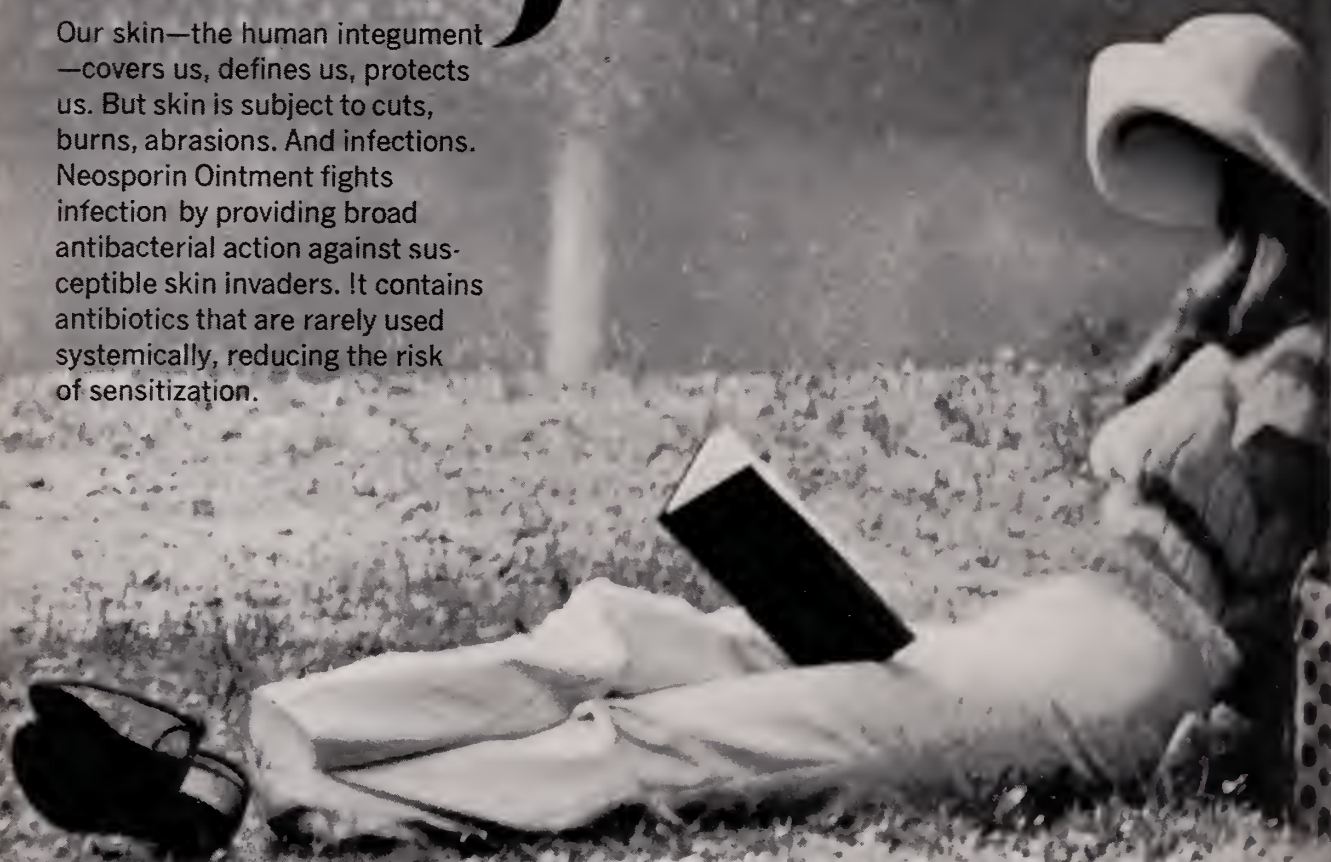
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PRECAUTION: As with other antibiotic preparations, prolonged use may result in overgrowth of nonsusceptible organisms and/or fungi. Appropriate measures should be taken if this occurs. Articles in the current medical literature indicate an increase in the prevalence of persons allergic to neomycin. The possibility of such a reaction should be borne in mind.

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Editorials

Heredity vs. Environment

THE FREQUENTLY asked question, "Which is more important, heredity or environment?" has no clear answer. In genetically determined diseases both are important and only for individual patients can one make a distinction of relative importance. In general, it may be more precise to say heredity proposes, environment disposes.

The case report by Drs. Fisch and Chang* is a good example of this interaction. Heredity for a child with phenylketonuria proposes that a child will become abnormal if it is raised as a normal child. Drs. Fisch and Chang by suitably altering the environment dispose of this proposition and permit the child with abnormal phenylalanine metabolism to grow as a normal child.

The choices seem to be clear, at least for this hereditary disease: an abnormal gene in a normal environment can produce a child with a disease. On the other hand, the same abnormal gene in a suitably abnormal environment can produce a child without disease. Two matched negatives can make a positive.

One of the most important changes in the practice of medicine is the emerging predominance of genetic diseases. Some have estimated that 70-80% of patients admitted to hospitals within the next ten years will be admitted for complications or chronic disease associated with an inherited genetic disorder. If this is true, then the general option, outlined so beautifully for this specific

disease with this specific patient, is that the abnormal genes must be identified early in life and suitable environmental alterations be made so that the abnormal action of the gene will not lead to an abnormal child.

The work which leads to the demonstration case is slow and tedious requiring long years of dedicated effort and careful clinical and laboratory documentation as well as a long view. This is the type of medicine which few doctors have learned and which few doctors have the courage to continue once they have learned the demands of such a practice. It is the type of medicine that a person must practice for years to obtain a small measure of personal satisfaction. Nevertheless, this type of care and prophylactic treatment program must eventually be made available for other abnormal genes. Drs. Fisch and Chang illustrate the progress being made concerning phenylketonuria. Comparable studies must be done on all the amino-acidemias which can produce syndromes of mental retardation. Comparable work must be done for all types of abnormal genes which produce clinical diseases. Such prophylactic therapy producing a normal child will be many-fold less expensive than the treatments required when an abnormal gene functions in a normal environment to produce a diseased patient. This concept and the care of chronic disease must become major elements in the teaching of the medical student today and in the continuing education and re-education of physicians in practice.

Warren Warwick, M.D.
University of Minnesota

*Fisch RO and Chang Pi-Nian: A phenylketonuric with superior intelligence. Minnesota Med 56:745, 1973.

Alcohol Treatment Centers*

THE AVAILABILITY of a chemical dependency treatment center within a community hospital complex tends to stimulate a wide range of involvement in the treatment of the patient. The geographical convenience permits the inclusion of the family, all concerned persons including the employer, other health care services where applicable. The opportunity is accordingly presented for expansion of post-treatment service planning and coordination with other resources, already ongoing.

The emphasis on family involvement by the author is well stated and is basic to a viable program of comfortable abstinence. The role of the physician is unique in the team approach in management of the many physical and physiological complications. His role in the intervention with the dependency is often relatively ineffective, because of the voluntary patient-doctor relationship. He is frequently unable to penetrate the fantastic denials, defenses and rationalizations of this syndrome. In reality, one sees in the majority of patients present-

ing for treatment the element of compulsion of taining from action by the employer, the court or concerned person with compelling influence.

The physician's supportive role in long-range planning once rehabilitation is underway may be vital to maintenance, ideally by the family physician, as recommended by the author. An occasional encounter with resentment from the Alcoholics Anonymous community is not without some validity. Following regain of control and rehabilitation, they recall past medical experience during which prolonged and injudicious use of chemicals led to substitution dependency, only to compound the problem. We have long been reminded by our own colleagues that the medical profession has been slow in considering alcoholism as an illness.

Increasing popularity of vigorous "post-treatment" programming by the professionals may be effective in the "treatment center failure" described by the author.

J. C. Miller, M.D.
Minneapolis, Minnesota

*Seifert MH: Alcohol treatment centers. Problems and recommendations. Minnesota Med 56:803, 1973.

Carotid Cavernous Fistula

DOCTOR SELJESKOG* has presented a concise summary of the history, anatomy, symptomatology and management of carotid cavernous fistula. His conclusion regarding the optimum form of management coincides with this reviewer's experience. It is of utmost importance that the ophthalmic artery be occluded at the same time the intracranial and extracranial internal carotid arteries are occluded. This promotes a prompt

thrombosis in the internal carotid artery which may not occur if the ophthalmic artery is left patent. In such instances not infrequently when the ophthalmic artery is occluded at a second sitting the fistula continues to drain through collateral channels which have built up from the small dural vessels arising from the internal carotid artery in the cavernous sinus.

Thoralf M. Sundt, Jr., M.D.
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Department of Neurosurgery

*See page 929.

Philosophical Musings of a Surgeon

We cannot condone violence under the image of a good cause.

Carl O. Rice, M.D.
Editor Emeritus

Renal Hypertension

THE DESCRIPTION by Olin and Hamilton* of two cases of secondary hypertension in a family elucidates various interesting and important points. First, it emphasizes the great role of angiography in the evaluation of hypertensive patients. If no contraindication to a possibly forthcoming operation exists, every patient with hypertension should undergo angiography, because if no surgically curable cause for the elevation of his blood pressure is found, the drug therapy must be a lifelong treatment.

Secondly, the finding of a renal artery stenosis in itself does not prove its hemodynamic significance. This can only be assessed by split renal function tests or by measurement of the pressor activity of renal venous blood. The latter is cur-

rently most often done by radioimmunoassay, where the formation of angiotensin, induced by renin, is measured with the help of isotopes. If the test does not give a high enough ratio to indicate the site of increased renin formation, pharmacological¹ or positional² stimuli, which have more affect on the kidney behind a significant stenosis, may be applied.

Third, it is not likely that the hypertension of patients with coarctation of the aorta is due to the same principle as in those with renovascular hypertension, which involves the renin-angiotensin-aldosterone system, but it still could be renal in origin.³ The authors' discussion of a possible common denominator in these patients' vascular morphology is certainly intriguing.

Claus A. Pierach, M.D.
Minneapolis, Minnesota

*See page 955.

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Transfusion Therapy with CPD

THE HISTORY OF transfusion therapy is, in part, the study of methods to preserve blood outside of the body. Many physicians are familiar with direct transfusions and the evolution of preservation methods since then—citrate solutions, Alsever's solution, heparin, dextrose solutions (ACD), frozen blood, and now CPD* solution. The addition of dextrose, to preserve the living red cell, and particularly its diphosphoglycerate and adenosine triphosphate metabolism, has been the major advance in this period. All blood used in Minnesota is now preserved in CPD solution which results in slightly better cell preservation and is more physiological when transfused, as discussed by Dr. McCullough and B. Weiblin† in his issue.

The patient who receives massive transfusions of CPD preserved red cells suffers less physiological insult and the cells function slightly better and longer in the recipient. The clinician should know his order for transfusion will now result in a slightly different response. The improvements are not spectacular, but blood service is a \$500,-million 'industry' involving six million donors, and improvement of any magnitude is important, both to the individual and to society.

In a way, even moderate improvements in transfusion therapy aggravate a problem—heavy utilization, perhaps overutilization, of a scarce and precious biological commodity.

Robert Woodburn, M.D.
United Hospitals-Miller

*Citrate Phosphate Dextrose.
†See page 980.

Coronary Artery Disease

THE IDENTIFICATION of the patient at high risk with coronary artery disease has been and continues to be a major difficulty in clinical medicine today. Prospective studies such as those at Framingham and retrospective statistical analysis in the Rochester study¹⁻⁴ have pointed out the predictive value of risk factors and have substantiated the use of certain clinical findings in determining a prognostic index. Cardiac enlargement, significant hypertension, cigarette smoking, electrocardiographic scars and conduction disturbances, elevated cholesterol, and congestive heart failure have been shown to correlate with a high mortality¹⁻⁴.

In his article "Clinical and Invasive Studies of Coronary Artery Disease" Peterson* has re-evaluated the use of clinical classification into functional classes on a basis of angina pectoris in determining the high risk patient with coronary disease. He points out that mortality rises as the class increases II to IV correlating well with the degree of anginal distress. This observation is in agreement with what others have found, however, Bruscheke, et al. (and others^{5,6}) have pointed out the value of coronary arteriography and IV angiography in understanding these prognostic signs. They have shown that clinical classification into functional classes on the basis of angina pectoris loses its predictive value in arteriograph-

ically comparable cases. The duration of angina pectoris has some predictive value, but of limited degree. The other major underlying factors are of more specific prognostic value, namely, the number of vessels involved, left ventricular dysfunction, electrocardiographic abnormalities, heart size, etc. We must be very careful in assuming that functional class alone is of major predictive value. The lack of randomization and criteria used in the selection of those for invasive studies in the paper by Doctor Peterson, makes it difficult to arrive at any definite conclusion.

Utilizing the known high risk factors, it is possible to construct a risk profile for mortality in five years and or recurrent myocardial infarction in the same period. The advantage that this has over a functional classification based on anginal disability is that it would allow identification of the patient at high risk with coronary artery disease who may be functional class I to II at the time the patient is seen. This approach would be more comprehensive and would allow selection of the patient at high risk with angina for early invasive, diagnostic, and therapeutic efforts before he becomes functional class III or IV. I, for one, hope that we see such an approach develop in the very near future for the selection of patients for more invasive studies.

G. T. Gau, M.D.
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*See page 944.

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"Third World" Health

ELSEWHERE IN THIS ISSUE of MINNESOTA MEDICINE, Dr. James Fett* of Pierre, S.D. has set forth, in stark terms, some of the health problems faced by the developing nations of the world. Dr. Fett reports on the basis of extensive first-hand knowledge, for he has served as a missionary physician in Africa for several years. I have been privileged to visit, for short periods, rural health care facilities in a South American country, two African countries, and South Vietnam, and I can testify to the reality of what Dr. Fett has reported.

Two points stand out as I reflect on my own limited experiences with "third world" health problems and as I read Dr. Fett's article. The first is that the developing countries are now fighting the medical battles that our nation was fighting at the turn of the century. The various indigenous infectious diseases still constitute the major health problems. Public Health measures, including population control, are the crying needs. Safe water supplies are more important for these countries right now than open heart surgery, a concept that our medical educators do not always grasp as they set out to be of help to these nations.

The second thing that has impressed me is the importance of the role played by various non-M.D. health personnel in these countries, individuals that we would probably refer to as "physician's assistants" in our country. Countries with one physician to 10,000 population currently have little or no prospect of reaching what we would consider a reasonable physician-to-population ratio within this century. Of necessity they must make do with less-well-trained personnel. I have been favorably impressed with how well this apparently works in many instances. I have, for example, seen in South Vietnam a district health facility ministering to the health needs of several thousand people under the direction of a very capable physician's assistant, who had had the equivalent of about two years of post-high-school training in health care.

Dr. Fett has done us a service in reminding us that health care problems are universal. I would only add that all of us American physicians could profit from a period of service in a "third world" mission, for surely it would do us good to be reminded of our own not so distant past and to appreciate anew the strides that medicine has made in our own country.

Robert B. Howard, M.D.
Minneapolis, Minnesota

*See page 995.

Cover Photo

"I'm Not Here"

Dr. Earl C. Henrikson took the cover photo in the woods of Wisconsin. The fawn was lying motionless amongst the leaves and its speckled fur is its camouflage. Dr. Henrikson was able to get many shots as he quietly walked up to it using a Contarex camera with a 135 mm lens.

Wild life photography using still and movie cameras is his hobby, and annually he shows films at the Audubon Society, Minneapolis Bird Club Show at the Public Library and before other groups.

Dr. Henrikson's specialty is general surgery. He is Associate Professor Emeritus in the Department of Surgery at the University of Minnesota, Minneapolis.

Carcinoembryonic Antigen

CARCINOEMBRYONIC ANTIGEN (CEA)* is a misnomer. CEA is a glycoprotein complex of antigens obtained by perchloric acid extraction of embryonic colon, meconium, or colon cancer tissue. CEA may be further partially purified by molecular weight, configuration, and electrical charge. CEA has not been characterized as to exact molecular weight or amino acid composition. CEA has not been isolated as a single molecular complex. CEA has not been synthesized.

CEA was injected into animals by Gold and Freedman in order to develop antibodies. These antibodies were subsequently used to test the serum of patients for the presence of circulating CEA. To date, there have been conflicting reports regarding the usefulness of CEA as a tool in diagnosis, prognosis, or treatment of cancer patients.

Anti-CEA antibodies are not made against a single antigen but rather against a complex of antigens. Thus, it is readily apparent that CEA tests will yield varied results in any large series. Radioimmunoassay is a highly sensitive and complex technical tool. The results of radioimmunoassay serum tests when applied to CEA are at present difficult to corroborate in any two laboratories. An eight to 10% error has been reported between two laboratories using the same tech-

niques and serums for testing. This variance is probably due to the fact that a single antibody and a single molecular antigen are not being used in the system.

CEA is not a tumor specific antigen. CEA is more likely a tumor associated group of antigens one of which may be specific for entodermally derived cancers. CEA is released from noncancerous injured cells of lung, kidney, gastrointestinal tract, and liver. Elevated CEA levels are also reported in smokers, patients on vitamin pills, and patients with various illnesses.

At present CEA is not of value in screening patients for cancer due to its lack of specificity and high false positive rate. CEA should be of value in following patients with cancer of the colon or pancreas for evidence of recurrence. Our own studies, done in conjunction with Dr. Henry Bates, Dr. Lyle Hay, and Dr. Lance Crombie involve several hundred patients and are to date inconclusive on this point.

The above should not detract from the major contribution of Dr. Phil Gold. He demonstrated that cancer associated antigens circulate and can be measured in the serum. This has raised our hope that truly tumor specific antigens will be isolated in the near future, allowing radioimmunoassay with monospecific antisera to detect cancer in its early stages. To this end we are all dedicated.

David F. Hickok, M.D.
Abbott-Northwestern Hospital
Minneapolis, Minnesota

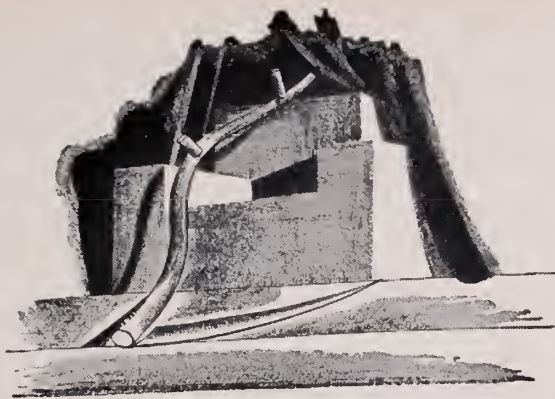
*Smith, HJ et al.: Radioimmunoassay of circulating carcinoembryonic Antigen in cancer patients. Minnesota Med 56:779, 1973.

Letter to the Editor

Dear Editor:

Many thanks for getting rid of the staples binding in MINNESOTA MEDICINE. I used to *hate* to review and save its articles because of the inevitable struggle with those little pieces of metal. It is also pleasing to have all the references in the journal (why was it ever otherwise?) but please keep them with the articles.

Ken Williamson, M.D.
St. Cloud, Minn.



In Memoriam

HANS P. BARTHOLDT, M.D.

Dr. H. P. Bartholdt, 50, of Mora, died July 8th. He graduated in 1952 in Munich, Germany, as a physician, and two years later received a doctorate in medicine. He came to the United States in 1956, and after two more years of training, interning, he started practicing surgery and orthopedic surgery in Bismarck, North Dakota. He later moved to Mora and set up his practice.

Dr. Bartholdt was a member of the Royal Society of Health, the Minnesota State Medical Association, the American Medical Association and the East Central Minnesota Medical Society. He was also cited by the Queen of England.

Dr. Bartholdt is survived by his wife, Helga, a daughter, Sabine and one son, Ralf.

CHESTER E. THIEM, M.D.

Dr. Chester E. Thiem, Mankato internist, died July 8. He obtained his medical education at the University of Minnesota.

Dr. Thiem was a member of the Mankato Clinic, the American Medical Association, the Minnesota State Medical Association and the Blue Earth County Medical Society.

He is survived by his wife, Karin, sons, Christopher, Fred and Nick and daughter, Lisa.

HELENE LITKEWITSCH, M.D.

Dr. Helene Litkewitsch, 65, St. Paul physician, died August 24. Born and educated in Russia, Dr. Litkewitsch, however, interned at St. Luke's Hospital in St. Paul.

She was a member of the Ramsey County Medical Society and the American Medical Association and an associate Member of the Minnesota State Medical Association.

Dr. Litkewitsch is survived by her husband, Eugene, and son, George.

RAYMOND J. JACKMAN, M.D.

Olmsted County Health Officer, Dr. Raymond J. Jackman, 67, died August 10. A noted physician, he was president of the Minnesota State Medical Association in 1970-71, president of the Minnesota Health Board in the 1960s and was a former chairman of a section of the American Medical Association. He had been a senior consultant in proctology at the Mayo Clinic and a former head of the Proctology Section. Dr. Jackman authored numerous books on proctology and was a former member of the American Board of Colon and Rectal Surgery. His medical degree was obtained at the University of Iowa.

Dr. Jackman was an honorary member of the Proctological Latina (Italy), the Argentina Proctologic

Society and the Alaska State Medical Association. He was a member of the council of the American Proctologic Society and the Zumbro Valley Medical Society.

Dr. Jackman is survived by his wife, Kathleen, a daughter, Collette, and two sons, Doctors Steven Jackman and Roger Jackman.

JOHN G. RUKAVINA, M.D.

Dr. John G. Rukavina, 59, St. Paul dermatologist and former clinical associate professor of dermatology at the University of Minnesota, died September 5.

A native of Hibbing, Dr. Rukavina earned several degrees at the University of Minnesota, including his degree in medicine. In recognition of his work in the field of dermatology, Dr. Rukavina was admitted into the National Society of Sigma Xi.

He was a diplomat of the American Board of Internal Medicine and the American Board of Dermatology and a member of the Ramsey County Medical Society, the American Medical Association, the Minnesota Dermatological Society and the Minnesota State Medical Association.

Dr. Rukavina is survived by his wife, Florene, sons, John, Gregory and Phillip and one daughter, Elizabeth.

CARL W. RUMPF, M.D.

Dr. Carl W. Rumpf, 78, physician and surgeon in Faribault, died August 21. A native of Chicago, Dr. Rumpf after his family moved to Minnesota attended schools in Faribault and later attended the University of Minnesota College of Medicine.

He served as school physician for Shattuck and St. Mary's Schools in addition to his private practice. He was a member of the Rice County Medical Society, the American Medical Association, the Southern Minnesota Medical Association, the American Academy of Family Physicians and the Association of Railway Surgeons. He was a 50 Club and Life Member of the Minnesota Medical Association. In 1958, he was awarded the "Old Shads" citation for distinguished service to the community of Faribault and Shattuck.

Dr. Rumpf is survived by two nephews and a niece.

LEON J. PETIT, M.D.

Dr. Leon J. Petit, 88, Minneapolis physician, died August 12. A native of Minneapolis, Dr. Petit obtained his medical education at the University of Minnesota Medical School. He also studied in Paris and Vienna.

Dr. Petit was a member of the Hennepin County Medical Society and the American Medical Association and a 50 Club and Life Member of the Minnesota State Medical Association.

He is survived by a daughter, Mrs. Pauline Hanson, and two sons, Dr. Julian V. Petit and Jean L. Petit.

Medicine's men on the Hill.

Just who are they? They're the AMA's permanent representatives to Congress and a part of the AMA's Washington staff.

In the 92nd Congress, about 10% of all legislation introduced was health-related—more than 2,500 bills. The AMA's representatives serve as the eyes, ears and voice for our profession on such legislation. Keeping in close contact with members of Congress and their staffs. Explaining and promoting our profession's views. Reporting on legislation. And providing legislators with resource material and information on medical and health subjects.

They're on the Hill to protect your interests,

lobbying to retain the basic principles of private practice in any government health program that might be enacted. Equally important, they lobby to insure the passage of constructive and workable health legislation for the public.

Sure, the AMA lobbies. We lobby for the rights and interests of our profession and for quality medical care for every American. By adding your voice, your support, we can be even more effective.

Join us.

We can do much more together.

American Medical Association

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Maybe the patient's self-diagnosis is right. He could have hay fever. But that bright red nasal mucosa, along with the thick discharge and excoriation around the nares, strongly suggests that the main problem is a cold. Hay fever or another form of allergic rhinitis may or may not be an underlying factor.

If a complete history and examination rule out allergic rhinitis, the long-term outlook will be a lot more favorable than his own "diagnosis" would have indicated.

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CONTRAINDICATIONS: Hypertension, glaucoma, and other significant cardiovascular disease. Dimetapp Extentabs are contraindicated during pregnancy and lactation. Under 1 year of age. Beware of the dry mouth thickening effect on the lower respiratory secretions. Dimetapp Extentabs should be used in the treatment of bronchospasm. Also, Dimetapp Extentabs should be used with caution in patients with heart disease and in those with a history of alcoholism.

and children, particularly young children, who may produce convulsion and death.

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Ⓜ Phenaphen with Codeine is now classified in Schedule III, Controlled Substances Act of 1970. Available on written or oral prescription and may be refilled 5 times within 6 months, unless restricted by state law.

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Snowmobiling with Associated Maxillofacial Injuries

CONRAD I. KARLEEN, M.D., D.D.S., F.A.C.S.*

SNOWMOBILES WERE invented for recreation and commercial ventures. However, the accident rate is rising due to carelessness and negligence in snowmobile operations. The consumption of liquor is a major factor. In a report from Ontario, Canada¹ the driver's condition was stated as "ability impaired" or "had been drinking" in 23% of the snow vehicle collisions, (62 of the total 272 accidents). In fatal collisions, in which snow vehicle driver's condition was specified, 50%, (12 out of 24 deaths) indicated alcohol was a factor. Post-mortem blood alcohol concentrations were available for six of the 12 snow vehicle drivers. In one the level was 0.13% and in five exceeded 0.17%. A study in Minnesota² indicates that one out of every 25 snowmobilers can be expected to be injured during his snowmobiling career.

In 1964 there were only 15,000 snowmobiles in the United States and Canada; as of March 1972 there were over 1,960,000 machines.³ In Minnesota 310,507 machines were registered in January 1973. The number has more than doubled since 1970. Minnesota requires all snowmobiles to be registered.

Bombardier of Valcourt, Quebec, is given the credit for being the first to develop the snowmobile into a salable product.⁴ His first commercial snow vehicle was developed in 1936, and in 1959-1960 he began the manufacture of snowmobiles. It was not until 1964 that the machine became available in mass production. Snowmobiling is the fastest growing winter sport in North America, increasing 35% yearly compared to 20% for the remainder of the recreational industries.⁵

This paper is concerned with 392 snowmobile injuries during the 1969 season from five Minne-

apolis suburban hospitals with special emphasis on maxillofacial (head and neck) trauma.

Material

Out-patient and in-patient hospital charts for 1969 were reviewed in five suburban hospitals peripheral to Minneapolis, Minnesota. These five hospitals were selected because of their high admission rates for snowmobile accidents.

Results

A total of 392 patients involved in snowmobile accidents in 1969 were treated in the five hospitals.

Of the total 392 injured, 209 received treatment for their injuries in the two smaller hospitals (Table 1). These hospitals were located near more open areas where there are greater opportunities for snowmobiling than the three hospitals located in the more congested areas.

Of the total, 103 sustained maxillofacial (head and neck) injuries (Table 2) and 20% were hospitalized.

TABLE 1
Distribution of Snowmobile Injuries by Hospitals
January 1, to December 31, 1969

Hospital	Beds	Inpts	Number of Injuries Outpts	Total
Mercy	144	10	101	111
Unity	139	9	89	98
North Memorial	560	34	36	70
Methodist	400	15	47	62
Fairview-Southdale	320	5	46	51
Total		73	319	392

TABLE 2
Distribution of Maxillofacial (Head & Neck)
Injuries by Hospitals
1969

Hospital	Inpts	Outpts	Total
Mercy	2	27	29
Unity	4	27	31
North Memorial	8	9	17
Methodist	2	10	12
Fairview-Southdale	4	10	14
Total	20	83	103

*Consultant for the Occupant Protection, Sub-Committee of the SAE Snowmobile and All-Terrain Vehicle Committee.

Presented at the Automobile Engineering Congress, January 14, 1972, Detroit, Michigan and at the Annual Meeting of the Minnesota State Medical Association May 19, 1972, Rochester, Minnesota.

Maxillofacial (head and neck) injuries accounted for 26% of all injuries in this series (Table 3).

Sixty-one percent of all head and neck injuries were lacerations of the face and scalp (Table 4). The average stay of the in-patients was three days except patients with associated injuries.

TABLE 3
Distribution of Snowmobile Injuries by Body Area
1969

Body Area	Inpts	Outpts	Total	Percent
Cranial	0	4	4	1.0
Maxillofacial (Head & Neck)	20	83	103	26.0
Upper Extremities:				17.9
Fractures	9	20	29	
Soft Tissues	2	32	34	
Dislocation	3	3	6	
Frostbite	0	1	1	
Trunk				9.5
Chest Trauma, Blunt	0	16	16	
Rib Fracture	2	2	4	
Pelvic Fracture	1	1	2	
Abdominal Trauma	1	2	3	
Back Trauma	0	5	5	
Spinal Fracture	4	1	5	
Genito-Urinary				
Contusions	1	1	2	
Lower Extremities				41.3
Fractures	20	19	39	
Soft Tissues	5	117	122	
Internal Derangement	2	4	6	
Miscellaneous*	3	8	11	2.9
Total	73	319	392	

*Includes contusions of extremities, not specified; multiple body injuries not classified under one area; arteriosclerotic heart disease with pulmonary edema (expired).

TABLE 4
Type of Maxillofacial (Head & Neck)
Snowmobile Injuries
1969

Type of Injury	Inpts	Outpts	Totals
Laceration of Face & Scalp	7*	57	64
Laceration with Avulsion of Teeth	1	3	4
Laceration of Cervical Area		3	3
Laceration & Abrasion of Cornea		3	3
Lacerations & Contusions of Face		10	10
Abrasions & Contusions of Face, Body	1*		1
Laceration Associated with Head Injury	1		1
Avulsion of Lower Lip	1		1
Mult. Lac. with Assoc. Facial Bone Fract.	4*		4
Laceration of Lip with Compress, Fract. L. 1-2	1		1
Fract. Nasal Bones, Comminuted		4	4
Fract. Nasal Bones, Compound		2	2
Fracture of Mandible	1	1	2
Fracture of Zygoma	1		1
Fracture, Blow-Out, Orbit	1		1
Fracture-Larynx with Fracture-Disloc. C5-6; T10-11	1*		1
Total	20	83	103

* See case histories

In 25 out-patients treated, the mechanism the injury was unknown (Table 5). They were listed in the hospital charts as "snowmobile accidents" and the direct cause could not be determined. Twenty-nine injuries (26%) were caused by striking part of the vehicle, 14 of them by the windshield. Seventeen injuries (16%) were caused by striking barbed-wire or cable. One-half of these patients were hospitalized.

TABLE 5
Mechanism of Maxillofacial (Head & Neck)
Snowmobile Injuries
1969

Mechanism of Injury	Inpts	Outpts	Total
Thrown from Vehicle	3	9	12
Struck Part of Vehicle	4	25	29
Collision with Fixed Object	2	6	8
Riding behind Snowmobile	1	2	3
Ran into Barb-Wire or Cable	9	8	17
Collision while Intoxicated	1	0	1
Overturned Vehicle	0	6	6
Hit by Auto	0	1	1
Caught Scarf in Clutch	0	1	1
Mechanism of Injury Unknown	0	25	25
Totals	20	83	103

Of the total injuries 68.8% occurred after the daylight hours (Figure 1).

Thirty-four injuries (33%) occurred in males between the ages of 25 and 35 (Figure 2).

One death occurred in Minneapolis, (Hennepin County) on January 10, 1970 (Table 6). A 12-year-old girl was strangled when a long scarf was pulled into the clutch of the family snowmobile in their backyard.

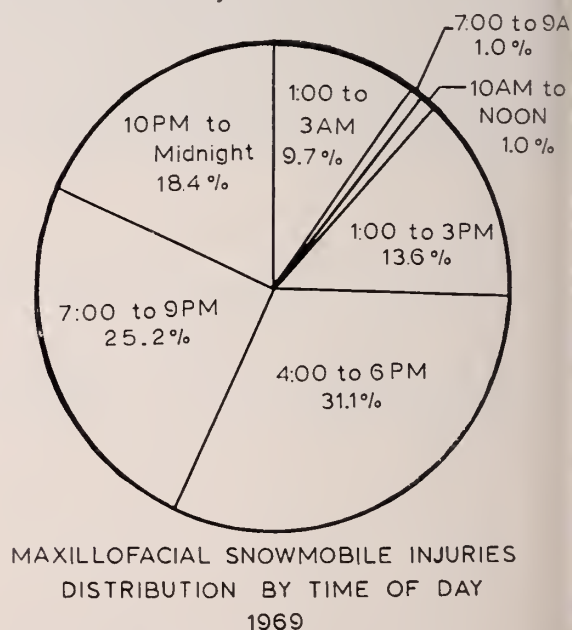


Fig. 1—Maxillofacial snowmobile injuries. Distribution by time of day. (1969).

SNOWMOBILING

NUMBER OF MAXILLOFACIAL SNOWMOBILE INJURIES
BY AGE AND SEX

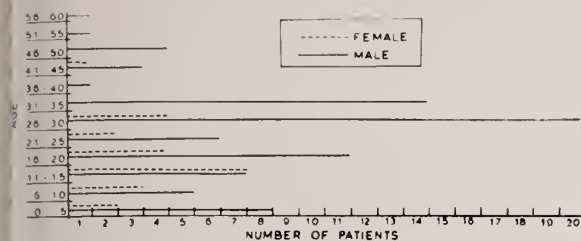
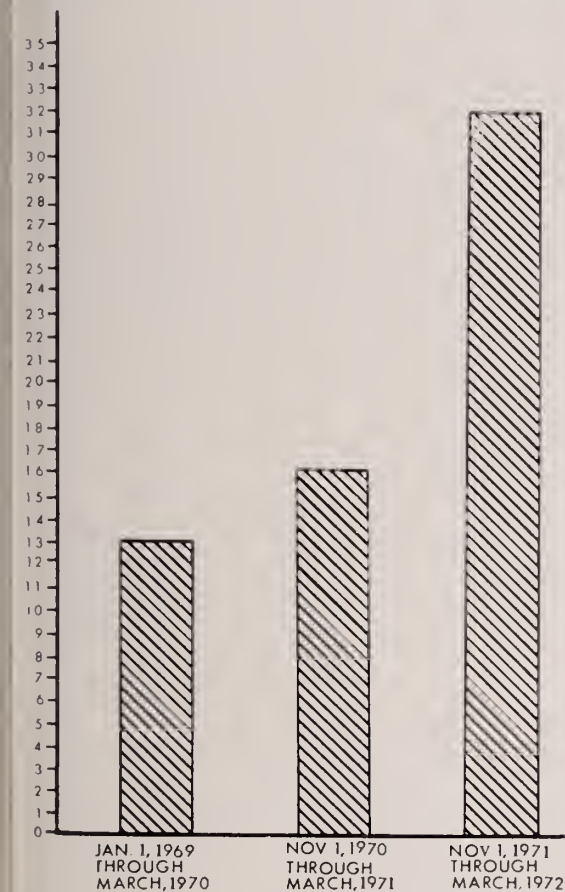


Fig. 2—Number of maxillofacial snowmobile injuries by age and sex.

TABLE 7

DEATHS FROM SNOWMOBILE INJURIES IN MINNESOTA JANUARY, 1969 THROUGH MARCH, 1972



MINNESOTA DEPARTMENT OF
NATURAL RESOURCES

WILLIAM SEVERSON, OUTDOOR SAFETY
SPECIALIST

The increase in death rates (Table 7) can be correlated with the increase in the number of operating snowmobiles. Forty-one percent of all deaths in the 1971-1972 series were caused by snowmobile-motor vehicle collisions.⁶

Case Histories

Cases 1 and 2

Husband and wife, both age 30, were riding in a field on a snowmobile about 12:30 a.m., January 1, 1969, and ran into a barbed wire fence. He sustained an avulsed flap laceration of the eyebrow and frontal area. She sustained a severe avulsed laceration involving the upper eyelid and entire periorbital area. Both patients were admitted to the hospital and plastic surgical repair was carried out under general anesthesia. Each required a hospitalization of four days. In April 1970 she had secondary scar revision of the upper eyelid.

Case 3

A white male, age 35, was snowmobiling during the middle of the night when he struck a steel wire sustaining a corneal laceration, multiple facial lacerations, fracture of the malar-zygomatic compound, fracture of the floor of the orbit, transverse fracture of the maxilla, and compound fractures of the nasal bones. He was hospitalized for 15 days. On the date of discharge the facial bones fractures had been adequately reduced and there was no diplopia. The past history revealed that he had been treated for a cervical fracture one year previously as a result of an automobile accident.

Case 4

A white male, age 33, was returning home alone on his snowmobile at 2:15 a.m. after a party December 21, 1969, when he was struck and run over by six snowmobilers. He did not lose consciousness and was on his feet after the accident. On admission to the hospital there was a distinct odor of alcohol. Examination revealed periorbital edema, subconjunctival hemorrhages, and contusions and abrasions of the face, back, and extremities. Xrays of the skull, facial bones, and extremities were negative. The patient was discharged from the hospital the next day.

Case 5

A white male, age 35, struck a steel gate while snowmobiling at 3:00 a.m. and was rendered unconscious at

TABLE 6
Causes of Death from Snowmobile Injuries
in Minnesota
January, 1969 through March, 1970

Cause of Death	Number	Age
Struck a Steel Cable (Same Accident)	2	17, 20
Drowning	1	33
Collision with Auto	2	18, 47
Hit by Train	2	30, 45
Strangulation (Scarf)	1	12
Hit Pole during Organized Race	1	19
Crushed under Snowmobile	1	44
Collision with other Snowmobile	2	25, 43
Thrown from Snowmobile	1	30
Total	13	

Minnesota Department of Conservation, St. Paul, Minnesota
William Severson, Outdoor Safety Specialist

the time of the accident, but regained consciousness upon arrival at the hospital. He required a tracheostomy on admission. He sustained lacerations to the frontal area, fractured larynx, fracture dislocation of C₅ and C₆, fracture dislocation of T₁₀, and T₁₁, and a hemothorax. He was hospitalized for 95 days and later transferred to the Veterans Hospital as a total paraplegic.

Discussion

In view of the growing accident toll, it is necessary that legislation be enacted governing snowmobiles, a safety training program be established and continuing efforts be made to improve the safety features of the machine. In Minnesota snowmobiles are under the jurisdiction of the Department of Natural Resources and are governed under a different code than other motor vehicles.

In Minnesota one of the laws passed in 1969⁷ makes it unlawful for a person under 14 years of age to make a direct crossing of a trunk or county highway. Between 14 and 17 years of age, to cross a highway, the driver must have a snowmobile certificate. Through the program of safety training for young snowmobilers,⁸ the Department of Natural Resources expects to reach an estimated 50,000 youngsters in Minnesota in the 14-17 age group. Legislation should require training and certification of the operator of a snowmobile with standards similar to those for drivers of automobiles.

During the 1972-1973 season the Department of Natural Resources predicts that there will be 50 deaths and 12,000 accidents of which 70% of the total will be personal injuries severe enough to require medical attention.

The manufacturers of snowmobiles are aware of the fact that many safety features must be built into the machines to make them safer in operation for the drivers and occupants to prevent serious injuries. Mongé and Reuter⁹ reported that the most serious injuries were of the head and most frequent to the legs. Chism and Soule¹⁰ reported severe back injuries due to lack of good seat cushions and shock-absorbing qualities of the snowmobile.

To prevent injuries the Occupant Protection Subcommittee of the Society of Automotive Engineers Snowmobile and All-Terrain Vehicle Committee recommended several safety features which are now being built into snowmobiles by a few manufacturers. Some of these safety features are listed below:

1. A Pulley Guard and Shield to enclose the

moving parts so that disintegrated parts will not escape in the direction of the operator or passenger causing injury and loose clothing will not enter or become entangled in the moving portion. Loose clothing is always considered a potential hazard.

2. To decrease accidents due to a sticky throttle by using an ignition "kill button" on the handle next to the throttle lever.
3. Padding of the handle bars to decrease facial injuries.
4. Improvement of seat cushions and shock absorbers to reduce back injuries.
5. Improvement of foot rests, a rubber non-skid pad wide enough to provide enough room for the occupant's feet.

Forty-one percent of all injuries were of the lower extremities. Enclosure of the exposed track and gear should be incorporated into the machine to decrease leg and foot injuries.

Twenty-six percent of all the injuries were of the head and neck. Martyn¹¹ reported 13% head and neck injuries and 6% corneal injuries in 135 hospital patients in a three-year survey (1967-1969) in Peterborough, Ontario. Dominici and Drake¹² reported 20% injuries of the head and neck in 155 patients in which complete statistics of the accidents were obtainable during the 1968-1969 season in Maine. Fink and Mongé¹³ reported 31 soft tissue injuries of the head and seven fractures of the skull and facial bones in a total of 171 patients treated in hospitals in Duluth, Minnesota, from November 26, 1968 through March 18, 1969. Withington and Hall¹⁴ reported seven facial injuries (fractures, lacerations) and seven closed head injuries (concussion and skull fractures) in 59 persons involved in snowmobile-related accidents. To prevent the snowmobilers from facial injuries from barbed-wire, cables, branches, and to decrease the wind-chill factor the author recommends that the wind shield should be raised to the height of the top of the head of the seated passenger and a roll-bar to be incorporated around the windshield. Four of the deaths in the 1971-1972 series were caused by snowmobile roll-over.⁶

The wearing of goggles and helmet would help to prevent corneal injuries and cerebral concussion. Daniel and Midgley¹⁵ proposed a crash helmet incorporating an integral face mask and visor currently worn by Grand Prix racing car drivers without restriction to their vision. Visors

for day and night driving can be attached to the helmet. This may help to reduce the number of eye injuries and facial bone fractures.

Summary

The charts of 392 patients who sustained snowmobile injuries from January 1, 1969 through December 31, 1969 and received treatment in five suburban hospitals outside the city limits of Minneapolis, Minnesota were reviewed.

Of the total 392 injured, 103 patients sustained maxillofacial (head and neck) injuries and accounted for 26% of all injuries in this series. The 61 deaths in Minnesota are listed from Jan-

uary 1, 1969 through March 1972. Four case histories are presented. Improvement in the windshield construction should be one way to decrease the number of facial injuries.

Acknowledgment

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With us ther was a Doctour of Phisik;
In al this world ne was ther noon hym lik,
To speke of phisik and of surgerye,
For he was grounded in astronomye.
He kepte his pacient a ful greet deel
In Hours by his magyk natureel.
Wel koude he fortunen the ascendent
Of his ymages for his pacient.
He knew the cause of everich maladye,
Were it of hoot, or coold, or moyste, or drye,
And where they engendred and of what humour.
He was a verray, parfit praktisour:
The cause yknowe, and of his harm the roote,
Anon he yaf the sike man his boote.

Ful redy hadde he his apothecaries
To sende hym drogges and his letuaries,
For ech of hem made oother for to wyne—
Hir frendshipe nas nat newe to bigynne.
Wel knew he the olde Esculapius,
And Deyscorides, and eek Rufus,
Olde Ypocras, Haly, and Galyen
Serapion, Razis, and Avycen,
Averrois, Damascien, and Constantyn,
Bernard and Gatesden, and Gilbertyn.
Of his diete mesurable was he,
For it was of no superfluitee,
But of greet norissyng and digestible.
His studie was but litel on the Bible.*

*Geoffrey Chaucer: The Canterbury Tales, "General Prologue," lines 411-444, written between 1387-92.

Citrate Phosphate Dextrose (CPD) Anticoagulant

in Blood Transfusion

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BLOOD STORED for transfusion, must be properly anticoagulated and well preserved. The original anticoagulant, sodium citrate, underwent several alterations to improve red cell viability, and for the last quarter century, acid-citrate-dextrose (ACD) has been the most widely used anticoagulant. Recent efforts to improve the quality of transfused blood have led to the development of citrate-phosphate-dextrose (CPD) anticoagulant.

Red cell viability is of major importance in evaluating anticoagulant solution but other factors should also be considered. During storage of blood, biochemical changes occur, which result in decreased red cell function and present a potential hazard to the recipient. Thus, the ideal anticoagulant should: (1) minimize these biochemical changes, (2) provide for good red cell survival and function and, (3) allow the harvesting of coagulation factors and platelets for use in component therapy. CPD appears to accomplish most of these functions better than ACD and is currently becoming widely utilized in blood transfusion.

Composition of CPD

The degree of cell damage during blood collection is a major factor in erythrocyte viability. ACD anticoagulant is hypotonic to red cells and the first 100 ml. of collected blood has a high percentage of hemolysis. In developing CPD anticoagulant, Gibson, et al.¹ attempted to provide a solution that is isotonic for red blood cells during all stages of collection and still produces an optimum pH in the final plasma. In CPD, the ratio of citric acid to trisodium citrate has been altered (Table 1) to give a net decrease of 15% in the citrate ion present and an increase in the pH of the solution. Both solutions contain the same amount of dextrose, which serves as a substrate for red cell glycolysis. Additional phosphate is

present in CPD to retard the breakdown of organic phosphates (ATP and 2,3-DPG) and thus provide better red cell viability and function.

TABLE 1
Comparison of the Composition of
CPD and ACD Anticoagulants

	ACD	CPD
Citric Acid	540 mg	206 mg
Sodium Citrate	1.49 g.	1.66 g.
Sodium Biphosphate	—	140 mg.
Dextrose	1.65 g.	1.61 g.
Volume Use for 450 ml of Whole Blood	67.5 ml	63 ml

Biochemical Changes in ACD and CPD Blood During Storage

The effects of this difference in anticoagulant composition can be seen by comparing the biochemical changes during storage of ACD blood and CPD blood (Table 2). The pH decreases due to the production of lactic acid by red cell glycolysis. The plasma pH of CPD on the day of collection is approximately 7.2, which is considerably higher than the pH of 7.0 in fresh ACD blood. Throughout 21 days of storage, the pH of CPD blood remains higher than that of ACD blood, making CPD blood safer for massive transfusion. Dextrose concentration has not been reported during storage of CPD blood. However, the amount of dextrose in CPD anticoagulant is the same as in ACD, so the concentration in CPD blood should be approximately the same as ACD blood. The plasma hemoglobin in CPD stored blood is less than ACD blood, probably because there is less hemolysis due to improved red cell preservation. Plasma sodium should be slightly higher in CPD than in ACD blood because of the additional sodium citrate. However, the only data available reports plasma sodium to be approximately the same in CPD as in ACD stored blood at 21 days. Plasma potassium is slightly less in CPD than ACD stored blood because of the decreased red cell hemolysis in CPD blood. Inorganic phosphate concentration is significantly higher in CPD blood because of

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See editorial, page 967.

BLOOD TRANSFUSIONS

TABLE 2
Biochemical Changes in ACD and CPD Blood During Storage at 4°C

Characteristics		Days of Storage			
		0	7	14	21
Dextrose	ACD*	330	280	240	220
mg/100 ml Wh. Bl.	CPD†				
Plasma Hemoglobin	ACD	5-10	15	25	50
mg/100 ml	CPD	4	10	21	30
Plasma pH	ACD	7.00	6.87	6.73	6.61
	CPD	7.20	7.00	6.89	6.84
Plasma Na	ACD	160	159	157	153
meq/l	CPD				153
Plasma K	ACD	7	14	19	23
meq/l	CPD	3	10	20	25
Inorganic Phosphates	ACD	0.6	1.5	2.2	3.0
mM/l plasma	CPD	3.6	3.6	4.2	4.9

*Values for the biochemical changes in ACD blood are from the Technical Methods and Procedures of the American Association of Blood Banks, Twentieth Century Press, Chicago, Illinois, Fifth Edition, pp. 196.

†Values for the biochemical changes in CPD blood are composite from references 3, 4.

ne additional inorganic phosphate in the anticoagulant solution.

Due to its isotonicity, CPD causes little osmotic damage to red cells during collection, resulting in better survival. The current NIH standard for red cell preservation is the survival of 70% of the red blood cells for 24 hours after transfusion. After 21 days of storage, red blood cells stored in ACD have approximately 80% survival, while CPD red cell survival is slightly higher.² However, after 28 days of storage, the survival of ACD erythrocytes falls below 70% while the survival of CPD cells is 70-75%.^{2,3,4} Thus, CPD anticoagulant is used for red cell storage of 28 days in parts of Europe and in Canada, although it is restricted to 21 days in the United States.

For effective red cell transfusions, the cells must not only survive storage but also must carry out their function of supplying oxygen to the tissues. When oxygen is bound to hemoglobin, the enzyme 2,3-diphosphoglycerate (2,3-DPG) is required to facilitate release of oxygen to the tissues. Red cell function can be evaluated by measuring 2,3-DPG or the partial pressure of oxygen at which 50% of the hemoglobin is saturated with oxygen (P_{50}). Both 2,3-DPG and oxygen P_{50} are better maintained in CPD blood than ACD (Table 3). In this respect, CPD blood after one week of storage is comparable to fresh blood while ACD blood deteriorates rapidly during the first few days of storage.^{5,6}

Clinical Experience with CPD Blood

CPD blood has been used experimentally in a number of clinical situations. Pediatric patients

at the Boston Childrens Hospital received over 3,000 units of CPD blood with no deleterious effects or complications attributed to the use of CPD anticoagulant.⁷ Thirty-seven of these patients received blood between 21 and 28 days old and in amounts greater than their own blood volume. In cases of massive transfusion, there was less depression of blood pH with CPD blood than with ACD. One child received approximately three times his blood volume of stored CPD blood, but maintained a normal blood pH.

Because citrate binds calcium and the increased phosphorus level could lead to further depression of serum calcium, it has been suggested that multiple transfusions of CPD blood might lead to hypocalcemia. However, Gibson, et al.⁸ studied several patients who received massive transfusions of CPD blood and did not find hypocalcemia or hyperphosphatemia to be a clinical problem.

For exchange transfusions of infants, CPD blood is recommended because of its more physiological pH and its better maintenance of red cell oxygen transport. CPD blood can be used for exchange transfusions after several days of storage without concern about 2,3-DPG levels. This

TABLE 3
Comparison of 2,3-DPG and P_{50} in Blood Stored in ACD and CPD Anticoagulants*

Days of Storage	2,3-DPG†		P_{50}	
	ACD	CPD	ACD	CPD
0	11.9	11.6	23.5	25.5
3	8.4	13.6		
7	5.0	11.9	21.9	25.9
10	2.5	9.9		
14	0.9	6.0	16.0	21.1
17	0.6	4.4		
21	0.5	2.9	15.2	19.8

*Condensed from Shafer, et al. J Lab Clin Med, 77:430, 1971.

†2, 3-DPG: micro moles/gm hemoglobin.

is particularly helpful in situations where fresh blood is difficult to obtain. Because CPD contains 15% less citrate to bind calcium ions, it is recommended that the dose of calcium gluconate be reduced to 0.85 ml of 10% solution for each 100 ml of blood.

Coagulation Factors and Platelets in CPD Blood

There is no significant difference between the amounts of coagulation factors in fresh CPD blood compared to fresh ACD blood and the changes in coagulation factors during storage are identical in CPD and ACD blood.^{9,10} For treatment of bleeding disorders, CPD blood is equivalent to ACD blood stored for a similar period of time.

The yield of Factor VIII in cryoprecipitate depends upon the pH of the original plasma.¹² Since acidified plasma reduces the yield of Factor VIII, it was anticipated that the higher pH of CPD plasma would result in improved Factor VIII content of these cryoprecipitates. Although neither Graybeal, et al.⁹ nor Shanberge et al.¹³ found

improved Factor VIII recoveries from CPD plasma, the Factor VIII content of cryoprecipitate was essentially equal in CPD and ACD plasma.

Platelets prepared from CPD blood have a slightly greater tendency to clump, because of the higher pH. However, present methods of platelet preparation result in very little platelet clumping so that the platelets prepared from CPD blood are similar in quantity and have similar *in vivo* recovery and survival as those from ACD blood.¹¹

Summary

Compared to ACD anticoagulant, CPD has the following advantages for blood preservation (1) isotonicity for red blood cells, thus minimizing the lesion of collection and resulting in improved red blood cell survival, (2) more physiological pH, (3) 15% less citrate ion, and (4) improved red cell oxygen transport. Many blood banks are now beginning the routine use of CPD in blood collections. This should result in an improved blood product for patient therapy.

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Specialized Care for Acute Myocardial Infarction

Four-Year Experience in a Community Hospital

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THE CONCEPT of the coronary care unit has been widely accepted.¹⁻⁸ The organization and policies of these units vary somewhat from hospital to hospital as to the type of patient admitted, length of patient stay, etc.

In making plans for the facility to serve our hospital we believed the scope should not be arbitrarily limited only to patients with coronary disease. It seemed to us that the advantage offered by such units was the collection of cardiac patients in one geographic site and their continuous electrical and medical surveillance from a central point. Such a facility might be expected to be useful for patients with a wide variety of cardiac problems. Our facility was named Cardiac Monitor Central (CMC), a term we believe to be accurately descriptive.

The United Hospitals-Miller Division is a 400 bed community hospital. It was planned that any member of the medical staff could admit a patient to the facility, but it was required that the patient be under the primary care of a member of the Department of Internal Medicine. The CMC was under the supervision of a cardiologist (JNK) who as a full-time staff physician was available for consultation. We were in the position of being able to collect information about the patient population to whom such a unit would be of service and in answering several questions. These included the ability of the physician at the time of admission to correctly diagnose a myocardial infarction in a patient generally known to him in his private practice and to characterize clinically and pathologically the patient who did sustain a myocardial infarction.

Methods

Admissions

The CMC was designed for all cardiac patients, although postoperative cardiovascular patients were usually cared for in another area. The bulk of the patients admitted had or were suspected of having an acute myocardial infarction. Other patients with serious arrhythmias or suspected of having arrhythmias or requiring intensive cardiovascular care and surveillance were admitted also. The patients were cared for by their individual internists, and there were no established standard policies for diagnosis or treatment. There were no arbitrary restrictions on age, condition of patient, or length of stay in the unit.

Of the 1,225 admissions to the CMC from April, 1967 to April, 1971 (Table 1), 451 fulfilled the criteria for myocardial infarction which will be discussed in the next section. Of the remaining 774 patients, 434 were admitted to rule out acute myocardial infarction and were found to have myocardial ischemia without infarction with or without congestive heart failure, or other disease including pulmonary embolism, gastroenteritis, cholecystitis, pericarditis, pancreatitis, herpes zoster, or influenza. Two hundred one patients were admitted primarily for the monitoring of cardiac

TABLE 1
Admissions to Cardiac Monitor Central:
April 3, 1967, to April 2, 1971

Reason for Admission	No. of Patients
Acute myocardial infarction	451
No myocardial infarction	774
Rule out acute myocardial infarction; myocardial ischemia without infarction, with or without congestive heart failure	434
Arrhythmia: heart block, faulty pacemaker, paroxysmal atrial tachycardia	201
Acute congestive heart failure with or without arrhythmias	96
Operative or postoperative arrest or arrhythmias	21
Miscellaneous	22
Total	1,225

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rhythm; the diagnoses for these patients included Adams-Stokes syndrome, heart block due to arteriosclerotic heart disease, paroxysmal atrial tachycardia, rapid atrial fibrillation, faulty pacemaker, and cerebrovascular accident. Ninety-six patients were admitted with acute congestive heart failure with or without arrhythmias secondary to digitalis toxicity, rheumatic heart disease, hypertension, or emphysema. Twenty-one patients were admitted following operative or postoperative cardiac arrest (usually noncardiac operations) or arrhythmias without infarction. There were 22 admissions for miscellaneous reasons.

Of the 774 patients without myocardial infarction, 35 suffered cardiac arrest while in the cardiac monitoring unit, and seven of them were successfully resuscitated (20% resuscitation rate). The average stay in the cardiac monitoring unit for the patients without infarction was 3.3 days with a range of one to 29 days.

Criteria for Diagnosis of Acute Myocardial Infarction

The triad of elements most useful in the diagnosis of acute myocardial infarction includes angina pectoris, sequential electrocardiographic changes, and alteration in the concentration of certain serum enzymes. The patients in this study accepted in the category of acute myocardial infarction demonstrated one of the following combinations: (1) a history of angina pectoris and classic electrocardiographic changes, (2) angina pectoris and typical serum enzyme changes, or (3) electrocardiographic and enzyme changes without typical angina pectoris. The diagnosis of subendocardial infarction was made when the clinical history was associated with the electrocardiographic signs of progressive acute ST-segment depressions or symmetric T-wave inversions.

The precise diagnosis of acute myocardial infarction is not always possible with present techniques. Among patients considered to have acute myocardial infarction, some false positives can be

TABLE 2
Prognostic Effect of Various Clinical Factors
in Patients with Acute Myocardial Infarction

	No. of Patients		Mortality (%)	
Total	451		22	
Sex	Male	Female	Male	Female
Total	278	173	16	32
Age (Yr.)				
49 or less	45	10	2	0
50-59	64	26	11	15
60-69	80	44	13	36
70-79	76	62	29	34
80 and over	13	31	31	45
Pre-existing Disease	% of Patients			
Coronary artery disease				
Angina	55		28	
Old infarction	36		30	
Congestive heart failure	19		45	
Hypertension	34		32	
Diabetes	20		28	
Electrocardiographic patterns				
Classic	75			
Anterior*	32		32	
Anterior-inferior	7		38	
Inferior	30		16	
Posterior-inferior	2		30	
Posterior	4		26	
Subendocardial	17		14	
Fixed changes of old infarct	7		34	
No diagnostic changes	< 1		0	

*Includes anteroseptal and anterolateral.

ACUTE MYOCARDIAL INFARCTION CARE

expected, i.e., patients without actual infarction. Similarly, among patients considered free from infarction, some false negatives can be expected, i.e., patients who actually do have myocardial infarction. Lown and co-workers⁹ have demonstrated that the error due to false positive diagnoses will be small if the diagnostic criteria just listed are adhered to whereas the error due to false negative diagnoses will be much larger. They reported that autopsies on patients who did not meet the criteria for acute infarction revealed that 25% actually had acute infarcts. Lindberg and associates¹⁰ reported that 15 to 20% of patients with acute myocardial infarctions may not be symptomatic. On the other hand, patients with acute coronary insufficiency may have symptoms exactly like those who have true myocardial infarction.

The case records of the 451 patients who met the criteria for the diagnosis of acute myocardial infarction were studied with reference to the incidence and prognostic effects of age and sex, preexisting disease, distribution of electrocardio-

graphic pattern of infarction, arrhythmia, and other complications. Mortality and causes of death were examined also and the mortality rate was compared with those reported from other hospitals.

Results

The Acute Myocardial Infarction

Population

Of the 451 consecutive patients admitted to the cardiac monitoring unit who were diagnosed as suffering from acute myocardial infarction, 278 were male with a mean age of 62.5 years, and 173 were female with a mean age of 69 (Table 2). A past history of coronary disease was common since 55% had a history of angina and 36% had had a previous myocardial infarct. Nineteen percent had a history of chronic congestive heart failure; hypertension existed in 34% and diabetes in 20%.

The average length of stay in CMC for the 451 infarct patients was 5.8 days with a range of one to 21 days.

TABLE 3
Arrhythmias and Other Complications in 451 Cases

Arrhythmias	*	%	†
	Patients		Mortality
Electrical instability			
Ventricular extrasystoles			
Rare	30		17
Frequent	32		31
Ventricular tachycardia	11		56
Potential electrical instability			
Sinus bradycardia	7		35
Nodal extrasystoles	2		40
Nodal rhythm	5		61
Heart block			
First degree	10		31
Second degree	6		44
Third degree	3		27
Pump failure			
Sinus tachycardia	21		31
Atrial extrasystoles	20		23
Atrial tachycardia	4		45
Atrial flutter	4		30
Atrial fibrillation	10		37
Electrical failure			
Ventricular fibrillation	16		52
Ventricular asystole	9		75
No recorded arrhythmias			
Complications			
Congestive heart failure	40		40
Moderate	23		30
Pulmonary edema	18		52
Hypotension	16		57
Shock	7		75
Renal failure	5		76
Unrelenting angina	7		23

*Percent of total 451.

†Percent of total in group.

Electrocardiographic Changes in the Acute Myocardial Infarction Population

Classic electrocardiographic changes were seen in 339 patients (75%), with anterior (32%) and inferior (30%) patterns being nearly equally prevalent. Subendocardial infarction occurred in 78 patients (17%). The remaining patients had a pattern of old infarction which remained unchanged (7%) or had no diagnostic electrocardiographic changes (nearly 1%). The distribution of these patterns is similar to that in the 300 consecutive patients studied by Lown and co-workers.⁹

Arrhythmias in the Acute Myocardial Infarction Population

In this study we followed the method of classifying arrhythmias suggested by Lown and associates.⁹ This method offers the advantage of relating the arrhythmia to the underlying clinical situation so that a system of therapy is provided. The first category of arrhythmia is that of manifest electrical instability and includes ventricular extrasystoles and ventricular tachycardia. The second category is that of potential electrical instability and includes sinus bradycardia, nodal extrasystoles, nodal rhythm, and heart block. The third major category is the arrhythmias of pump failure which have the common denominator of arising from left ventricular "pump failure." These include sinus tachycardia, atrial extrasystoles, atrial tachycardia, atrial flutter, and atrial fibrillation.

Of the 451 patients with acute myocardial infarction, 89% (401 patients) exhibited arrhythmias. The results are summarized in Table 3. A large number (62%) exhibited either rare or frequent ventricular extrasystoles. This is similar to reports of others.^{11,12} The relative incidence of the various other arrhythmias is comparable to that in these published reports with a few exceptions. Notably, the percentage of patients displaying ventricular tachycardia, sinus bradycardia, third degree heart block, sinus tachycardia, and atrial extrasystoles was lower in this series, sometimes by half, but nevertheless significant numbers of patients did have these conditions.

Fifteen patients (3%) developed complete heart block following the infarction, and 11 of these (73%) exhibited an inferior or posterior-inferior infarction. Similar findings have been reported in the literature.¹¹

Ventricular fibrillation or asystole occurred either primarily or secondarily in 108 patients (24%). The incidence of ventricular fibrillation

and asystole in this series was high compared to some reports.^{9,11} Whereas Day¹³ reported a 14% incidence of ventricular fibrillation in 273 patients Lown's group⁹ reported an incidence of electrical failure of only 2% among their 300 patients. Lown and co-workers also emphasized in this regard the importance of abolishing minor arrhythmias of ventricular origin, of recognizing the potential electrical instability caused by the presence of bradycardia, of controlling heart blocks, and of treating early incipient heart failure.

In this study of the 108 patients with ventricular fibrillation or asystole, the arrhythmia was primary in 84. Of these, 27 survived the electrical failure and were discharged from the hospital, a successful resuscitation rate of 32%. Other successful resuscitation rates as reported vary from 13 to 67% (Table 4).

Prognostic Effects of Various Clinical Factors

Features of the population sample which may affect prognosis include sex, age, prior coronary artery disease, development of heart failure, hypotension, and the various arrhythmias.

The overall mortality rate in the 451 cases of acute myocardial infarction was 22%. The mortality rates available from the literature are tabulated in Table 4 and they range from 14 to 32%. In the extensive study of Hofvendahl from Sweden,⁶ the coronary care unit mortality rate of 17% was compared with a concurrent control hospital mortality rate of 35%.

Among the females in our series, the mortality rate was 32%, which was twice that of the males (16%). Of the 99 deaths, 44 occurred in males and 55 in females. This contrasts to the ratio of males to females of 1.6 in the total group of 451 patients. In addition, a greater than average mortality rate became evident a decade earlier for females than for males and remained higher for females in each decade thereafter. For females, the mortality rate increased from 15% in the age decade of the fifties to 36% in the sixties, while for males it went from 13% in the sixties to 29% in the seventies. This leads to the conclusion that age and sex are significant in the case of acute infarction in that prognosis is poor at an earlier age in women than in men. This finding differs from some reports^{19,20} and agrees with others.²¹

With respect to preexisting disease a high mortality rate (45%) was found for those patients

ACUTE MYOCARDIAL INFARCTION CARE

having a past history of congestive heart failure. The mortality rate was also higher than the overall average for those with a past history of hypertension (32%) or old infarction (30%). As a group, patients with preexisting diabetes had a slightly higher than average mortality rate (28%). There was a sharp difference, however, when these patients were divided according to sex. Among females with diabetes the overall mortality rate was 39%, while among males it was 15%.

The mortality rate for patients showing electrocardiographic signs of acute infarction involving the anterior as well as the inferior surfaces of the heart was almost double the average mortality, being 38%. Those with an electrocardiographic pattern of old infarction also had an increased mortality rate (34%). It is interesting that the electrocardiographic pattern diagnosis of acute inferior infarction was associated with a lower

overall average mortality rate (16%) than the entire group. Acute subendocardial infarction carried a lower mortality (14%).

Table 3 shows that an increased mortality rate was associated with ventricular tachycardia, nodal rhythm and, in general, with those arrhythmias associated with pump failure. Among all patients with acute myocardial infarction, left ventricular failure is a common complication and it was observed in 40% of the patients in this series. Frank pulmonary edema occurred in 18% of all cases. Congestive heart failure carried a mortality of 30 to 52%, depending upon severity. Cardiogenic shock is one of the most serious complications of acute myocardial infarction and, in this series, hypotension, shock, and renal failure carried grave prognoses with mortality rates of 57, 75, and 76%, respectively.

TABLE 4
Summary of Mortality Rates in Various Hospitals from Literature Including
The United Hospitals—Miller Division*

Hospitals	No. of Myocardial Infarctions	Period Covered	Avg. Days Monitored	Mortality		Resuscitation	
				Control Patients %	Monitored Patients	Attempts	Successes
Toronto General Hospital, Canada ¹⁴	789	Mar. 13, 1962 to Mar. 12, 1967	5	40	235(30%)		16(15%)
Methany Hospital Kansas City, Kansas ⁴	411	May 20, 1962 to May 20, 1967	5	34	85(20%)	46	31(67%)
Royal Infirmary Edinburgh, Scotland ¹⁵	400	Apr. 18, 1966 to May 10, 1967	3	22	70(18%)		23(52%)
Royal Melbourne Hospital, Australia ¹⁶	300	1967	3	34	82(27%)	26	8(31%)
New York Hospital Cornell University Medical Center ¹⁷	250	Jan., 1965 to Dec., 1966	5	30	32(32%)† 37(25%)†	30 36	4(13%) 7(20%)
London Hospital London, England ¹⁸	150	Nov., 1965 to Dec., 1966	3	—	21(14%)	25	10(40%)
Peter Bent Brigham Hospital Boston, Mass ⁹	300	1967	5	—	53(18%)		
Serafimerlasarett Hospital Stockholm, Sweden ⁶	132	Sept. 18, 1967 to Sept. 17, 1968	3	35	23(17%)	24	6(25%)
Mount Sinai Hospital Minneapolis, Minn. ⁷	100	Sept. 9, 1966 to Dec., 1967	5	34	21(21%)	16	7(44%)
Len Falls Hospital Len Falls, New York ⁸	244	Apr. 1, 1966 to Oct. 1, 1967	7	—	34(18%)	—	—
United Hospitals—Miller Division St. Paul, Minn.	451	Apr. 3, 1967 to Apr. 2, 1971	6	—	99(22%)	84	27(32%)

*A portion of this Table has been reported by Trajano and associates¹.

†Initial 100 patients and subsequent 150 patients, respectively.

ACUTE MYOCARDIAL INFARCTION CARE

Of the 451 patients with myocardial infarction admitted to the CMC, 99 died during hospitalization; 79 of these 99 patients (80%) died in the CMC. Of those dying in this unit, 42 (53%) had been admitted within less than six hours from onset of symptoms and a total of 81% had been admitted within 24 hours from onset of symptoms (Table 5). The time interval from admission to death in

the central monitoring unit ranged from four hours to greater than two weeks with 57 (72%) of the patients dying within the first six days (Table 6 *Causes of Death* (Table 7)

The cause of death is here defined as the underlying basis initiating the sequence of events leading to death. Primary electrical failure accounted for more than half or 57 of the deaths; in 35 of these cases, heart failure was present. Forty-four of those deaths occurred in the CMC and 13 in general wards of the hospital after the patients were transferred from the unit. Half (30) of these deaths occurred after the first week of hospitalization. In one case of ventricular fibrillation, hypokalemia was apparently associated, while in one case of asystole complete atrioventricular block was associated.

Pump failure manifesting generally as shock was the cause of death in 34 patients. All but two of these deaths occurred in the CMC and the majority occurred in the first six days after hospitalization. In ten cases (nine of them in women), demise occurred over a very short period of time and autopsies revealed ventricular rupture. Lown and associates¹¹ have termed this phenomenon "complete pump failure" whereby the patient

TABLE 5
Interval Between Onset of Symptoms and Admission of 79 Patients Dying in Cardiac Monitor Central

Interval (hr)	Patients	
	No.	%
< 6.0	42	53
7-12	12	15
13-24	10	13
> 24	15	19

TABLE 6
Interval Between Admission and Death for 79 Patients Dying in Cardiac Monitor Central

Interval	Patients	
	No.	%
0-12 hours	14	39
13-24 hours	17	
2-6 days	26	33
> 6 days	22	28

TABLE 7
Causes of Death Among 99 Patients Dying from Acute Myocardial Infarction

Causes of Death	No. of Deaths at Time Intervals in Hospital					Subtotal		Total
	12 hr	13-24 hr	2-6 days	7-14 days	14 days	CMC	Hospital wards	
Primary electrical failure (total)	7	7	13	18	12	44	13	57
Cardiac arrest								
Ventricular fibrillation	2	1	2	2	1	7	1	8
Asystole		2	1	3		6		6
Heart failure associated	5	4	9	11	6	31	4	35
Probable electrical failure			1	2	5		8	8
Pump failure (total)	7	9	13	4	1	32	2	34
Complete pump failure with ventricular rupture	3	3	3	1		10		10
Shock	2	3	2	1		7	1	23
Shock and congestive heart failure	2	2	2	1		7		
Shock, congestive heart failure, and renal failure		1	6	1		8		
Left ventricular failure:								
Aortic stenosis					1		1	1
Miscellaneous mechanisms (total)		1	1	3	3	3	5	8
Uremia					1		1	1
Pulmonary emboli				3	1	1	3	4
Dissecting aortic aneurysm		1			1	1	1	2
Perforation with pacemaker			1			1		1
Total	14	17	27	25	16	79	20	99

does not appear critically ill until the moment of death. The results are similar to those reported in the study done by Hofvendahl.⁶

Autopsies were performed on 60 of the 99 patients (61%). Coronary atherosclerosis was extensive in all cases (Grade 3 to 4) and cardiomegaly was noted in about one-third of the cases. Pulmonary congestion, edema, or both were found in about half of the cases. The majority of those dying of electrical failure had old healed areas of infarct as well as an acute process.

An acute myocardial infarct was recognized anatomically in 48 of the autopsied cases. A fresh coronary artery thrombus was found in another three cases, but no acute myocardial infarct was recognized in these three cases although areas of healed infarction were present. In another seven cases, only areas of healed infarction were recognized with additional complicating processes including aortic stenosis, hypertension, aortic insufficiency with cystic medial necrosis, and previous Vineberg procedure. No infarct was revealed in two cases with the cause of death being acute dissecting aortic aneurysm with rupture.

Discussion

The great majority of the patients (72%) were admitted to the CMC because of the suspicion of a myocardial infarction. In patients generally known to him in his private practice, the attending physician at the time of admission was able to correctly

predict the presence of myocardial infarction about one-half of the time (51%). Most of the remaining 28% of admissions were for various arrhythmias or congestive heart failure.

Analysis of the data reveals certain findings which are particularly noteworthy. The average mortality rate for all patients with myocardial infarction was 22%. Females had an overall mortality rate twice that of males, a higher than average mortality rate a decade earlier than males, and a much higher mortality rate than males when diabetes was present. It was of interest that nine of the ten cardiac ruptures occurred in females.

With regard to preexisting disease, congestive failure carried the highest mortality rate, followed by hypertension and old infarction. Arrhythmias occurred in 89% of the patients with ventricular extrasystoles having the highest incidence. Congestive heart failure, hypotension, shock and renal failure were the complications that carried the gravest prognosis.

In this study, a large proportion of the deaths (57 of the 99) occurred from primary electrical failure with or without heart failure. Most of these failures occurred in the CMC, and half occurred after one week of hospitalization. Even though the successful resuscitation rate of 32% (27 of 84 attempts at resuscitation) is comparable with the average rates reported by other coronary care units, deaths from this cause are still high. From this study, it seems possible that the mortality rate can be further reduced by placing greater emphasis on the prevention and vigorous treatment of cardiac arrhythmias.

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Mike Finamore was told he had leukemia. Nine years ago.

When Mike Finamore was thirteen years old, he was told he had leukemia.

At that time, this meant he had five, maybe six months, to live.

But just about then, leukemia research produced some dramatic results:

A special combination of drugs that would kill the leukemia cells in the blood and permit the person to live longer than ever before.

So Mike was treated. And it worked.

He didn't die.

Instead, he became one of the fortunate few to have leukemia and live. And today his weekly treatments enable him to lead a normal life.

In fact, right now he's putting the roof on a house he built himself.

And when it's finished there will be a double celebration.

The new house. And Mike's 22nd birthday.

Most people expect presents. Mike's happy just to have a birthday.

We want to wipe out cancer in your lifetime. Give to the American Cancer Society.



Mexican Arthritis Clinics

A Statement by the Committee on Rheumatic Diseases
of the Minnesota State Medical Association

The Committee on Rheumatic Diseases has been asked by a number of physicians to comment on the Mexican arthritis treatment centers which are attracting a considerable amount of public interest in Minnesota as they have elsewhere in the country. The lay press has published descriptions of these clinics. One of the most recent articles was printed in the NATIONAL OBSERVER on June 13, 1973. Both the American Medical Association and the American Rheumatism Association are attempting to obtain factual data to present to the medical profession. This is not easy. Details about treatment used have not been published in reputable medical journals by the attending physicians at these clinics. Nor have these facts been made readily available otherwise to the medical profession.

The State Committee on Rheumatic Diseases has learned that a number of arthritis treatments are established along the Mexico-United States border. Known centers exist in Mexicali near Calexico, California, Piedras Negras near Eagle Pass, Texas, Juarez near El Paso, Texas, Nogales near Tucson, Arizona, and Tecate near San Diego. In addition, the widely publicized treatment (Liefport) previously available at the clinic of Dr. Robert Liefmann of Montreal is now available at a branch of that clinic opened in Mexico City.

Patients who have attended these centers have reported their experience and have provided samples of the drugs which have been analyzed. These patients describe the experience as follows: After a brief interview with an attending physician who takes a history of the rheumatic problem and examines the joints, laboratory studies of blood or urine may be done. Following this, most of the patients have been given a prescription for medicines which they are told to have filled in one of the nearby pharmacies. In some cases, injections of drugs have been given at the "clinic." The nature of the medicines has not been fully explained to the patients we have talked with. Many of these patients, fearing the use of steroids, have asked the physician at the arthritis treatment center about

the nature of the drugs recommended and have been told that the drugs did not contain "cortisone." There is reason to believe, however, judging not only from the evident side effects of hypercortisonism but from identification or chemical analysis of the tablets that a significant proportion of the medicines prescribed are in fact an adrenocorticosteroid.

Samples of these drugs for which patients have paid amounts ranging from \$100 to several hundred dollars for a six month supply have been identified as steroids (cortisone acetate, methylprednisolone, dexamethasone, triamcinolone, etc.), tranquilizers (Valium, Stelazine), monoamine-oxidase inhibitors (Parnate), analgesics such as acetaminophen, dipyrone, antihistamines (chlorpheniramine), male and female sex hormones, and dimethyl sulfoxide (DMSO). The directions patients have been given for using these medicines—and especially for reducing or discontinuing the medication after a period of use—have been sketchy at most.

There is no doubt but that many of these drugs taken in large doses will "cover up" much of the pain and discomfort of inflammatory arthritides such as rheumatoid arthritis and even of degenerative joint disease. But none of these medicines are cures. The side effects, while varying from patient to patient, may be dangerous. Among the serious side effects in some patients with rheumatoid arthritis have been a devastating progression of rheumatoid vasculitis. In others, a rapid irreversible joint destruction has occurred. Such joint destruction can be expected also in some patients with degenerative joint disease who overuse the damaged joints when the warning sign of pain is decreased.

Some patients (and some members of the press) ask, "Isn't it worth the risk of dangerous side effects from these powerful drugs if one can get some relief of the pain and disability of arthritis even though it be only temporary?" "Why not buy now, pay later?" The answer is that the price,

in terms of permanent disability and increasing pain, is too great in the long run. Ultimately, it falls to the patient's home physician to "pick up the pieces" when the initial benefits are gone and the patient's situation is worse than it was when he sought the miraculous cure in Mexico. Only rarely is arthritis sufficiently painful and disabling that our current treatment measures are ineffective. Even in these situations there is little evidence to show that the massive drug therapy advised in these Mexican arthritis treatment centers is beneficial over the months or years which typify the course of chronic arthritis. There is considerable evidence that the results of such prolonged and massive steroid therapy are bad.

Minnesota physicians who are asked to care for patients who have been treated at these Mexican border clinics would do their profession and their patients a great service by documenting as much as possible the facts about this treatment and forwarding it to the American Rheumatism Association. The Committee on Rheumatic Diseases is interested also in learning of these facts and would be happy to assist in transferring the information to the American Rheumatism Association.

Mexican Arthritis Drugs

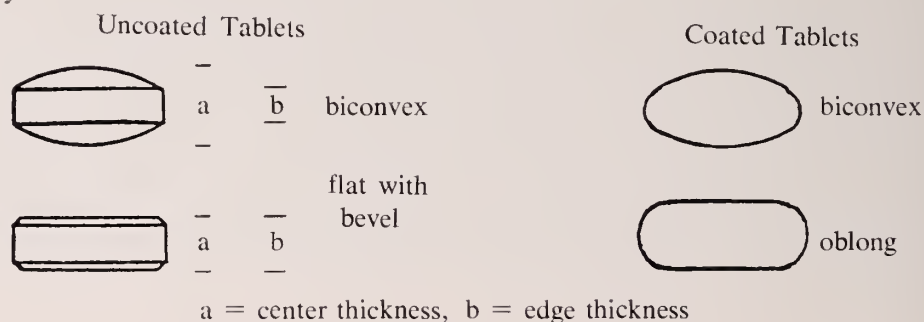
The following list describes a number of dosage forms for drugs which were analyzed in the Food

and Drug Administration Laboratory in Minneapolis. These drugs were submitted by arthritics or their physicians and were presumably purchased in Mexicali, Mexico. Because many of the dosage forms appeared frequently, this list was prepared to aid in the identification of these drugs.

The dimensions and weights are based upon the relatively few drugs submitted and may not be statistically significant. Coated tablets and capsules will undoubtedly deviate most from the data given. It should be emphasized that the drug content, particularly for the capsule forms, could be changed in the future. It may also be possible that drug forms exist which may be similar in appearance but contain other ingredients than those given in this list. Therefore, the conclusions reached, based upon appearance alone, should be used with some reservation.

The description of tablets is in the following sequence: coating, top view, side view, type of coloring (i.e., solid, speckled, etc.), color, marking, and scoring. The number and color description appearing in parentheses refers to *JAMA* 182, 12:1146 (Dec. 22, 1962), "Identification Guide for Solid Dosage Forms" by John J. Hefferen, which also contains some of the descriptive terms in this list. The color descriptions can be most accurately defined by referring to the standard color chart in the *Journal*.


Key:



Tablets

- Description: Uncoated, round, flat with bevel, solid, white, unmarked,* scored $\frac{1}{2}$. Diameter: 8.0 mm, center thickness: 2.8 mm; edge thickness: 2.35 mm.

Weight: 175 mg.

Comments: *Some tablets marked . Unmarked tablets have been sold as ibuprofen ("Motrin").

Contents: 16 β -methylprednisone acetate.
- Description: Uncoated, round, flat with bevel, solid, light green (No. 32, green), unmarked, scored $\frac{1}{2}$. Diameter: 8.1 mm, center thickness: 2.75 mm, edge thickness: 2.15 mm.

Weight: 180 mg.

Contents: 16 β -methylprednisone acetate.

MEXICAN ARTHRITIS CLINICS

3. Description: Uncoated, round, flat with bevel, solid, pale peach (No. 13, red), marked **M**, scored $\frac{1}{2}$. Diameter: 8.0 mm, center thickness: 2.35 mm, edge thickness: 1.6 mm.
Weight: About 180 mg.
Contents: Diazepam ("Valium").
4. Description: Uncoated, round, flat with bevel, very slightly speckled, brown (No. 16, brown), unmarked, scored $\frac{1}{2}$. Diameter: 8.2 mm, center thickness: 2.8 mm, edge thickness: 2.1 mm.
Weight: 170 mg.
Contents: 16 β -methylprednisone acetate.
5. Description: Uncoated, round, flat with bevel, yellow, marked **H**, scored $\frac{1}{2}$. Diameter: approx. 7.1 mm, center thickness: 2.8 mm, edge thickness: 2.25 mm.
Weight: Approx. 140 mg.
Contents: Unknown.
6. Description: Uncoated, round, yellow (No. 34, yellow, slightly lighter), marked **L**, impressed, scored $\frac{1}{2}$. Diameter: 6.37 mm, center thickness: 4.50 mm, edge thickness: 2.0 mm.
Weight: 115 mg.
Contents: Mepenzolate bromide.
7. Description: Uncoated, biconvex, pale green (No. 33, green), unmarked, unscored. Diameter: 10.4 mm, center thickness: 5.25 mm, edge thickness: 2.5 mm.
Weight: 450 mg.
Contents: Tetracycline hydrochloride.
8. Description: Uncoated, flat with bevel, white, marked **Lepetit**, scored $\frac{1}{2}$. Diameter: 12.8 mm, center thickness: 3.9 mm, edge thickness: 2.9 mm.
Weight: 565 mg.
Contents: Meproamate.
9. Description: Coated, oblong, somewhat biconvex (side view), dark pink (No. 30 red), white core, unmarked. Length: 17.4 mm, width: 9.7 mm, thickness: 6.1 mm.
Weight: 840 mg.
Contents: Meproamate.
10. Description: Coated, round, biconvex, pale green (No. 31, green, but lighter), white core, unmarked. Diameter: 9.0 mm, thickness: 4.8 mm.
Weight: 290 mg.
Contents: Chlordiazepoxide.
11. Description: Coated, round, biconvex, pale green (No. 31, green), pale brown mottled (No. 16, brown) core, marked **SKF** in red. Diameter: 9.9 mm, thickness: 3.9 mm.
Weight: 330 mg.
Contents: Trifluoperazine ("Stelazine").
12. Description: Coated, round, biconvex (somewhat oblong), light brown (No. 21, brown), white core, unmarked. Diameter: 8.0 mm, thickness: 4.7 mm.
Weight: 220 mg.
Contents: Oxyphenbutazone.
13. Description: Clear, colorless, conventional-shaped, unmarked, hard gelatin, No. 3 capsule, containing white powder.
Weight: Gross capsule weight: 350 mg, contents: 300 mg.
Contents: Hydrocortisone, hydrocortisone acetate.
14. Description: Clear, colorless, conventional-shaped, unmarked, hard gelatin No. 2 or No. 3 capsule, containing white powder.
Weight: Gross capsule weight: 300 mg, 380 mg, contents: 250 mg, 320 mg.
Contents: 16 β -methylprednisone acetate.
15. Description: Clear, colorless, conventional-shaped, unmarked, hard gelatin, No. 2 capsule, containing yellow powder.
Weight: Gross capsule weight: 370 mg, contents: 310 mg.
Comments: Contents is nonuniform in color; appears to be mixture of white and yellow powders. Contents: Unknown, possible steroid.



**She came from a nice quiet town
to find something stronger than marijuana.**

A lot of small towns think they
don't have any drug problem.
Because their drug problems
move away. And die someplace
else.

The cancer of drug addiction

has spread throughout the country
and we're not going to wipe it out
overnight.

But let's do something.
Let's get started. Troubled
teenagers are among the people in

this town who are crying out for
our help.

Poor people, sick people, old
people, disturbed people are
counting on us.

Give the United Way. Please.

If you don't do it, it won't get done.



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"Third-World" Health

JAMES D. FETT, M.D., M.P.H.*

THE HARSH REALITY of grossly inadequate medical care so prevalent in wide areas of the developing countries, the "Third-World," cannot be appreciated by considering only a statistical presentation of the need.

In many areas of the "have-not" nations no statistical data are even available. Misery, poverty, illness, and death follow their progression without entering the statistical mill.

When data are available (inadequate though they may be) we have a glimpse of the chasm which divides the "developed" world from the developing world:

- (a) Per capita income (1970)¹: U.S.A. \$4,262 compared to under \$300 in many nations: Tanzania \$91, Indonesia \$107, Kenya \$130, Mauritius \$222, Paraguay \$230, Korea \$241, Ecuador \$247.
- (b) Crude death rate per 1000 population (1970)²: U.S.A. 9.4 compared to greater than 20 in 42 nations of whom 35 are African and seven Asian. (range: Lesotho 21—Upper Volta 29.1).
- (c) Infant death rate per 1000 live births (1970)²: U.S.A. 19.8 compared to greater than 75 in 47 nations of whom 36 are African and seven Asian. (range: Bolivia 77.3—Zambia 259).
- (d) Population per medical school³: U.S.A. 2,100,000 compared to Asia 5,500,000 and Africa 14,900,000.
- (e) Population per physician (1971)⁴: U.S.A. 669 compared to greater than 10,000 in 48 nations of whom 32 are African and 13 Asian. (range: Angola 10,363—Upper Volta 92,759).

Because of uneven physician distribution population per physician data do not indicate the low level of care available. Urban areas may have well under 1000 population per physician while rural areas in the same country have in excess of 100,000 per physician.^{5,6} A few nations in the developing world, even in the face of urgent needs unmet in many areas, actually are exporters of physicians because of political, economic, and professional conditions.⁷

Health needs in the developing world are difficult to conceptualize if one is not directly exposed

to those needs. Only as "developed" nations' medical personnel cross the boundary into areas of abject need does an emotional reaction and realization of needs occur. Responding to the needs entails certain important emphases which include:

1. *The necessity that medical education and training be adapted to the social, medical, and economic conditions existing in each country.*⁸

An excellent example is the Haile Selassie I Public Health College and Training Center at Bondor, Ethiopia,⁹ where personnel are trained as a team who will be able to work in diverse regions and situations within the country.

It would be unrealistic to project a goal of achieving the placement of a physician for each village. This is neither attainable nor desirable for too often the physician would be unable to carry out the work for which his training prepares him. In such a setting one must consider the importance of regional medical centers as well as the essential role of medical assistants, sanitary officers, diploma nurses, and other auxiliary medical personnel. One must further encourage the concept of health team, recognizing the value and importance of each member.^{10,11}

2. *The necessity to coordinate activities through National Health Ministries in developing countries.*

In the international health scene one is impressed by the array of assisting agencies varying in the extent and emphases of their participation as well as being of diverse origins, from governments (national and international, i.e., United Nations), to private foundations, to church-related ventures. Not infrequently their efforts are poorly coordinated, sometimes valuable efforts being wasted in terms of ultimate accomplishments.

It would seem reasonable that this coordination would be carried out by each National Health Ministry. This would help to avoid unnecessary duplication of efforts both in training and of care, with resultant inefficient use of already limited personnel. This would also involve the placement of medical centers in the best utilizable location, avoiding both what would appear to be competitive facilities in any one area as well as areas

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See editorial, page 969.

completely destitute of care.

3. *The necessity for continuing and expanding relationships between United States medical programs in developing nations (not necessarily limited to medical schools) aimed towards the development of indigenous health personnel.*

A desirable goal could be that each medical school would recognize the mutual value of and engage in a contracted relationship with a medical school or program in a developing country. Could not each American school through a coordinating agency, such as the Association of American Medical Colleges, relate itself to a nation with great needs and mutually create programs which (again) point towards developing indigenous medical personnel?

Numerous examples of relationships already exist: the Rochester-Lagos faculty exchange, the Tulane-Columbia program in medical education, the Duke University programs in international health, the Indiana University-Jinnah (Pakistan) Postgraduate Medical Center relationship, the Albany Medical College-Georgetown Hospital, British Guiana, clinical exchange, the University of Kansas, University of Philippine's Student-Faculty exchange,¹² and the Seoul National University cooperative project with the University of Minnesota, including programs in medicine.^{14,15} One would need to encourage funding through U.S. Aid and/or various private foundations.

4. *The necessity to encourage continuing exchange of medical graduates and trainees between the developing and "developed" nations.*

Aside from the primary aim of helping to meet urgent needs, exposure to medical needs in developing areas has a solutary effect upon our young medical graduates and trainees. The consequent broadening of understanding of the world community's needs, the increased awareness of oppressive health burdens borne by many populations in developing countries, the intercultural experiences gained, must all be considered as assets to the returning participant and to his further contribution as he establishes himself in whatever role it may be in medicine.

This participation would certainly be facilitated if each medical school center has a related coun-

terpart in a developing nation. Such a relationship would also permit developing nations' trainees to participate in programs in this country. Their participation has increased value when done on the post-graduate level (at which time the trainee is familiar with medical needs in his country) and with a definite time limitation so that his training in this country is useful to the development of his own country and that the program is not simply encouraging a "brain-drain" on his country.

5. *The necessity for continuing and increasing recognition of the importance of the role of preventive medicine combined with the development of family planning services so that advances are not eliminated by soaring populations.^{11,13}*

Natural population increase rate (excess of crude birth rate per 1,000 population over crude death rate per 1000 population) exceeds 20 in 48 African nations and 33 Asian nations compared to rates of 8.8 in the U.S.A., 4.4 in the United Kingdom, and 1.7 in the Federal Republic of Germany.²

When advances in health services and development of economies are slow as is often the case it is clear that these advances can be quickly erased with rapid increases in population. While this is readily understood by individuals in favored situations, for those in situations in which death from infectious and parasitic diseases is a common occurrence, particularly among children under five years of age, there will be no receptivity to birth control programs. One must first demonstrate the ability to preserve the life of these infants.

The purely hospital-oriented, disease-treatment oriented approach clearly has not been able to do this. The importance of the role of preventive medicine in the developing nations is now recognized. Where health budgets are severely limited (many developing nations have less than \$1 per inhabitant annually available for health expenditure¹¹) programs in the preventive medicine field have far greater yields in terms of population benefits per dollar expenditure. This does not exclude the role and importance of clinical medicine but again emphasizes the importance of careful coordination of programs.

References 1-15 will be found on page 982.

Conflict Society and the Profession of Medicine*

GEORGE B. MARTIN, M.D.†

SOCIETY IS ASKING what we are doing to improve the public health and why is what we are doing so expensive. People believe that if we are pressured enough we can and will deliver care to meet the public expectation.

The physician is acknowledged as society's only member educated and trained to evaluate a person's total health status, to determine what is likely to happen to that person, and to formulate what, if anything, may be done to alter that course. The physician diagnoses, prognoses, and manages, not the patient, but the problem that makes a person a patient. As the years pass, we find increasing restriction, regulation, obstruction, and change being instituted by society and its politics which not only force us to function differently but occasionally decrease our ability to carry out our prime responsibility. The physician knows that inadequate nutrition, poor housing and working conditions, pollution, poverty, poor education, lack of genetic counselling, racism, drugs, alcohol, promiscuity, and a passive acceptance of accidental and highway death and injury, when coupled with society's improper use and abuse of services now available, all contribute to ill health. He is relatively powerless to affect any of these, but the record shows he has altered many of them to a higher degree than most professions.

Medicine knows that within 30 years the total body of knowledge available will be fourfold that of 1970 and it is making genuine progress in the effort to assimilate and make it usable. The traditional work ethic of physicians is changing. The commitment to the 70 hour work week is disappearing and the search for fringe benefits and a higher quality of family and social life is gaining momentum. Increased government programs eliminate the charity patient; and the end of the exploitive practices involving the health care worker as decreased total productivity and increased costs of health care delivery. Changing patterns of payment for health and medical care have greatly altered educational funding practices at a

time when the educational process is being reviewed and altered substantially, thus causing increased burdens on the educational segments of our profession.

Medicine's ethic of reverent regard for each human life until death can no longer be thwarted, often finds itself in conflict with the emerging ethic of health and well being of society and humanity as a whole, which is assuming a compelling importance as a condition of the quality of life for our species. Undoubtedly these ethics will accommodate each other. Hopefully medicine's contribution to this resolution will be sufficient to preserve basic humanistic qualities in society's ethical structure. What is this society of ours? Why over the past 20 to 30 years do we find ourselves in the midst of strange and unsettling times? Who or what is responsible? It is even now difficult to find common agreement on basic ingredients of right and wrong.

Society would appear to be losing its individualism, its self. It is losing faith in long established institutions and organizations. Society is searching for meaning, often times by faulting the old while groping for something new. Society is trying to escape from freedom rather than be lost as a selfless individual. The old is crumbling, the new not yet established. A specific legislator is OK but as a politician he is not OK. My physician is OK. AMA or organized medicine is not OK.

Our congested highly mobile society has passed the stage of industrialization and is in the throes of technocracy and bureaucracy. According to Topfler, we are on the verge of "ad-ocracy" with its ever increasing narrowing of specialization and affluence generally increasing. The cult of youthfulness and the "nowness" of need satisfaction are with us and are exploited by politicians, social innovators as well as the advertising media. These circumstances lead to disappearance of old values and they are causing rootlessness. If you work for a large impersonal organization, live in crowded circumstances, make few friends and are then separated from them; when your family is somewhere else as is your church and school, and you haven't a strong sense of self and self-com-

*Speech delivered to the House of Delegates at the Annual Meeting of the Minnesota State Medical Association, May 23, 1973.

†Past-President of Minnesota State Medical Association.

petency, you become, as it were, alienated from the old and even from yourself. This is a terrifying state for most people. To escape it, you seek pleasure, physical and material. You seek reassurance, usually from your physician, clergyman, or friends. You seek new roots which now seem to be special interest groups, social or political, consumer groups, unions, activist groups, anywhere you can feel accepted, comfortable—*rooted!*

The dependency on new values and groupings with its usual concurrent passive-aggressive characteristics develops, complete with the helpless anger. The wave of anti-intellectualism, collectivistic solutions to problems and backdoor, meaning legislated, humanism, i.e., the right to health, knowledge, money and good feelings, completes the picture of the alienated, cynical society demanding product accountability, civic, social and financial responsibility with amorphous public control applied to all its institutions, organizations and government. Society now is rejecting the intellectual, paternalistic decisions as to what is best or right or proper for it.

Do you wish some examples? A few pertinent ones: lay representation on professional examining boards, professional union developments, retroactive denial of Medicare benefits, increased demand for tranquilizers and instant cures, increased malpractice suits and settlements, minimalization of professional input into planning activities. Do they sound familiar?

What should our course of action be? What principles do we adopt to guide us as we diagnose, prognose, and manage our patients' problems and thereby hopefully enrich our society?

To me there is but one simple answer with many complicated ramifications thereof. *Humanism* is the answer. The basic concept of selfhood for all within the boundaries of protection of others' rights and privileges. Our patients are individuals and should be acknowledged as such. When they are lacking that quality we cannot give it to them, but we may help them to find it. We must refrain from managing people and their lives. We must instead help them manage the problems that brought them to us and we must recognize their right to refuse our counsel even though the risks they run by so doing are numerous. When in fact they are not capable of judging for themselves, we must be careful that our dis-

agreement with their choice is not the cause of forced management but that course of action truly is the result of their inability to make human judgments.

No one can legislate feelings or the way society will act. Institutions cannot force society molds at will. No organization can by itself dictate exactly what is good or right for society.

I propose that in understanding our society as physicians become radical activists standing for the human condition of individualism and development of self-determination with all its associated anxieties, for this is *truly freedom*. We must as individuals and organizations adhere to intellectual honesty and the ethics of human dignity and then in spite of philosophical divergence on individual points speak out loud and clear for freedom of self and others, our patients, our society realizing always that many will disagree with us and that is their right.

If you wish one example that exemplifies society's state today, its alienation, its searching for meaning, its conflicted ethical structure as well as one complicated ramification of my simple principle of humanism, I suggest that you contemplate the recent Supreme Court decision concerning abortion.

If you recognize Frohm, Reick, Topfler, Novak Rogers and many others in this text, you are perceptive. To borrow from yet another, John Millis I submit we should deemphasize the curative aspects of our profession and accentuate the *caring*. First and foremost, we should care about our patients for if our motivation is otherwise, we are not worthy to care for them. If we do not care about them, we will be dogmatic, paternalistic and manipulative. By caring about and for them, we will be supportive and enhance their growth and thereby society's maturation.

Times are changing, states the sage. Will we as a profession regret the change and wish it were as of old? Will we utilize our capabilities merely to cope with the changes; or will we actively undertake to understand the human condition (*that's diagnosis*); extrapolate to where it's leading (*that's prognosis*); and have the guts to put ourselves in the middle of conflict to promote humanization (*that's management*). That is what being a physician today requires. Are we equal to it? Do we as a profession hear Thoreau's distant drummer and shall we try to hold his cadence?

Laboratory Letter

Computer Integrated Thyroid Tests

I shall explain the reasons for a computer program that does the following:

1. lists diagnostic possibilities for PBI, T-4 (Murphy-Patte) and T-3;
2. calculates thyroid indices (PBI X T-3, or T-4 (M-P) X T-3);
3. gives messages under certain conditions.

These messages include a list of contaminating substances when the PBI exceeds 20 mcg.%; notes indicating that free thyroid indices are a better measure of thyroid function than PBI, T-4 (M-P), or T-3 considered alone; another note saying the free thyroid index is normal and therefore the patient is euthyroid; and finally, a suggestion to order a T-4 (M-P) when the PBI is elevated.

Why use a computer to integrate thyroid tests and to give these messages?

Well, for openers, relationships between PBI, T-4 (M-P), and T-3 are tough to remember. At least this is true for most of us. Maybe you're better at it. Anyway, look at Table 1 to refresh yourself. In Table 2 note the practical consequences of these relationships.

TABLE 1
Relationships between Thyroid Tests

Common Conditions Effecting Tests				Free Thyroid Indices	
	PBI	T-4 (M-P)	T-3	PBI X T-3	T-4 (M-P) X T-3
Normal Persons	Normal	Normal	Normal	Normal	Normal
Hyperthyroidism	Increases	Increases	Increases	Increases	Increases
Hypothyroidism	Decreases	Decreases	Decreases	Decreases	Decreases
Hormones (Pregnancy, Estrogen, Oral Contraceptives, etc.)	Increases	Increases	Decreases	Normal	Normal
Diseases or Drugs, Increasing Thyroxine Binding Globulin	Increases	Increases	Decreases	Normal	Normal
Diseases or Drugs, Decreasing Thyroxine Binding Globulin	Decreases	Decreases	Increases	Normal	Normal
Iodine or Iodide Contamination in Euthyroid Persons	Increases	Normal	Normal	Increases	Normal

TABLE 2
Summary of Thyroid Test Results
in 100 Consecutive Patients on Whom PBI, T-4 (M-P), and T-3 Ordered.

	PBI	T-4 (M-P)	T-3	PBI X T-3	T-4 (M-P) X T-3
	69	84	79	84	94
Normal (Euthyroid Range)					
Increased (Hyperthyroid Range)	20*	5	12	5	3
Decreased (Hypothyroid Range)	11	11	9	6	3
Total	100	100	100	95†	100

*Includes five contaminated PBIs over 20 mcg.% and eight borderline values between 8.0 and 8.8 mcg.%. Because of the many borderline high values, we suspect upper limit of 8.0 mcg.% may be set too low.

†Total less than 100 because computer does not calculate PBI X T-3 when PBI contaminated.

LABORATORY LETTER

As you can see from these tables, there is no single thyroid function test that will give you a true picture of thyroid status under all circumstances. But if you're ordering only one, T-4 (M-P) is probably the best.

Probably the best combination of thyroid tests to order is T-4 (M-P) and T-3 with a calculated free thyroid index ($T-4 \times T-3$).

Which brings us back to the original question: Why the computer for thyroid function tests?

Simple enough.

The computer saves you the time and trouble of:

1. remembering normal ranges;
2. integrating thyroid tests with each other and with other tests;
3. calculating and comparing thyroid indices; and,
4. recalling, on-the-spot, the reasons why for differences or inconsistencies between results.

The following seven figures (retyped from actual printouts) will serve to illustrate what has just been said.

Richard L. Reece, M.D.
Minneapolis, Minnesota

Normal Tests	Value	Normal Range
Calcium	9.7	8.3 - 10.3
Phosphorus	3.4	2.2 - 4.5
Glucose	116.	68. - 125.
Bun	17.0	5.8 - 23.0
Uric Acid	4.4	2.0 - 8.5
Bilirubin	.6	.2 - 1.1
Cholestrol	263.	118. - 300.
Total Prot	7.3	5.5 - 8.0
Albumin	4.3	2.8 - 4.9
Globulin	3.0	1.8 - 3.6
A/G Ratio	1.4/1	.7 - 1.8
LDH	142.	76. - 212.
SGOT	24.	8. - 48.
ALK Ptase	55.	16. - 91.
PBI	5.4	4.0 - 8.0
T3	33.0	25.0 - 35.0
T4	5.3	3.5 - 8.5
FTI (PBIT3)	178.	100. - 280.
FTI (T4T3)	175.	87. - 297.

All tests normal for age and sex.

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 1—Sample of output. All thyroid tests normal.

Normal Tests	Value	Normal Range
Calcium	9.2	8.6 - 10.3
Phosphorus	3.2	2.3 - 4.5
Glucose	108.	73. - 123.
Bun	17.0	4.5 - 21.9
Uric Acid	4.7	1.9 - 7.4
Bilirubin	.5	.2 - 1.1
Cholestrol	227.	129. - 268.
Triglyc	112.	10. - 160.
Total Prot	7.5	6.1 - 7.9
Albumin	3.8	3.5 - 5.0
A/G Ratio	1.0/1	.9 - 2.0
LDH	156.	79. - 212.
SGOT	19.	8. - 48.
ALK Ptase	51.	9. - 84.
T3	25.0	25.0 - 35.0
T4	7.6	3.5 - 8.5
FTI (PBIT3)	207.	100. - 280.
FTI (T4T3)	190.	87. - 297.
Sodium	136.	135. - 147.
Potassium	4.1	3.5 - 5.5

Abnormal Test	Value	Normal Range	St Dev Away From Normal
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PBI	High	8.3	4.0 - 8.0	1
Globulin	High	3.7	1.8 - 3.6	1

All abnormal tests are borderline and may be physiological and clinically insignificant.

The free thyroxine index PBI times T3 is normal, indicating that the patient is euthyroid.

High PBI may be due to pregnancy, estrogens, oral contraceptives, hepatitis, acromegaly or iodides.

Possibilities

High globulin

Diagnostic possibilities

Acute or chronic inflammation

Hyperlipoproteinemia

Degenerative vascular disease

Alcoholism

Macroglobulinemia

Collagen disease

Sarcoid

Liver disease

Analbuminemia

Cryoglobulinemia

Plasma cell myeloma

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 2—Sample of output. Only PBI abnormal, and even then only borderline high. Free thyroid index (PBI x T-3) indicates patient euthyroid. A typical thyroid pattern for patient taking oral contraceptives, or in pregnancy.

THYROID TESTS

Normal Tests	Value	Normal Range
Calcium	8.5	8.1 - 10.2
Phosphorus	3.4	1.9 - 4.3
Glucose	99.	77. - 134.
Uric Acid	9.4	3.1 - 9.5
Bilirubin	.5	.2 - 1.2
Cholestrol	190.	100. - 252.
Total Prot	6.3	5.3 - 7.7
Albumin	3.3	2.8 - 4.8
Globulin	3.0	1.9 - 3.4
A/G Ratio	1.1/1	.7 - 2.0
LDH	190.	68. - 221.
SGOT	43.	8. - 48.
T3	35.0	25.0 - 35.0
FTI (PBIT3)	105.	100. - 280.
FTI (T4T3)	101.	87. - 297.

Abnormal Test	Value	Normal Range	St Dev Away From Normal
ALK Ptas High	100.	25. - 85.	2
PBI Low	3.0	4.0 - 8.0	2
Bun High	26.0	9.7 - 25.6	1
T4 Low	2.9	3.5 - 8.5	1

The free thyroxine index PBI times T3 is normal, indicating that the patient is euthyroid.

Low PBI may be due to nephrotic syndrome, chronic disease, acromegaly, cytomel, acth, cortisone, methyltestosterone, mercurial diuretics, salicylates, dilantin, chlorpromazine.

The free thyroxine index T3 times T4 is normal, indicating that the patient is euthyroid.

Low T4 may be due to anti thyroid drugs, T3 therapy (cytomel), dilantin, high doses of salicylates, testosterone, acth, corticosteroids, diseases depressing thyroxine-binding globulin, hereditary thyroxine-binding deficiency.

Possibilities

Non-fasting specimen

High: Bun ALK Ptas

Degenerative vascular disease (CHF, arteriosclerosis, hypertension)

High: Bun ALK Ptas

Serum artifact (old overheated too long on clot)

High: ALK Ptas

Hepatic or biliary damage (EG drug hepatitis or cholecystitis)

High: ALK Ptas

Renal Insufficiency

High: Bun ALK Ptas

Prerenal Azotemia (Chf, Shock, etc.)

High: Bun ALK Ptas

Regional Enteritis

High: ALK Ptas

Osteomalacia, rickets or vitamin D deficiency

High: ALK Ptas

Steatorrhea

High: ALK Ptas

Alcohol ingestion or alcoholic hepatitis

High: ALK Ptas

Pancreatitis

High: ALK Ptas

Tissue necrosis, IE abscess, gangrene, peritonitis, etc.

High: ALK Ptas

Collagen disea, especul lupus and lupus hepatitis

High: ALK Ptas

Bone Metastases

High: ALK Ptas

Metastatic tumor in liver

High: ALK Ptas

Pseudohypoparathyroidism

High: ALK Ptas

Pulmonary embolism or infarction or bronchopneumonia

High: ALK Ptas

Carcinoma

High: ALK Ptas

Pagets Disease

High: ALK Ptas

Ulcerative colitis

High: ALK Ptas

Acromegaly

High: ALK Ptas

Prolonged immobilization

High: ALK Ptas

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 3—Portion of printout. Pattern from 75-year-old man chronically ill from heart failure. Although PBI and T-4 low, both thyroid indices normal, indicating euthyroid state. Pattern due to drugs, such as aspirin, occupying thyroxine-binding sites on globulin. For reasons we cannot yet explain, low PBI, low T-4, and high T-3 is a common pattern in elderly people.

Normal Tests	Value	Normal Range
Calcium	9.7	8.6 - 10.3
Phosphorus	3.2	2.3 - 4.5
Glucose	83.	72. - 122.
Bun	10.0	4.2 - 21.7
Uric Acid	3.1	1.8 - 7.4
Bilirubin	.4	.2 - 1.1
Cholestrol	188.	125. - 263.
Triglyc	130.	10. - 160.
Total Prot	6.9	6.1 - 7.9
Albumin	3.9	3.5 - 5.0
Globulin	3.0	1.8 - 3.6
A/G Ratio	1.3/1	.9 - 2.1
LDH	106.	77. - 210.
SGOT	20.	8. - 48.
ALK Ptas	64.	8. - 83.

Abnormal Test	Value	Normal Range	St Dev Away From Normal
PBI Low	1.6	4.0 - 8.0	3
T4 Low	1.3	3.5 - 8.5	2
FTI (PBIT3) Low	37.	100. - 280.	2
FTI (T4T3) Low	30.	87. - 297.	2
T3 Low	23.0	25.0 - 35.0	1

The free thyroxine index PBI times T3 is Abnormal. Since it is more reliable than PBI or T3 it is being used to consider diagnostic possibilities.

The free thyroxine index T3 times T4 is abnormal. Since it is more reliable than T3 or T4, it is being used to consider diagnostic possibilities.

Possibilities

Hypothyroidism

Low: FTI (PBIT3) FTI (T4T3)

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 4—Hypothyroid pattern.

Normal Tests	Value	Normal Range
Calcium	9.0	8.3 - 10.3
Phosphorus	2.8	2.2 - 4.5
Glucose	105.	68. - 125.
Bun	13.0	5.6 - 22.8
Uric Acid	5.1	2.0 - 8.4
Bilirubin	.4	.2 - 1.1
Cholestrol	194.	117. - 300.
Total Prot	6.7	5.5 - 8.0
Albumin	4.2	2.9 - 4.9
Globulin	2.5	1.8 - 3.6
A/G Ratio	1.7/1	.8 - 1.8
LDH	149.	76. - 211.
SGOT	30.	8. - 48.
ALK Ptas	33.	15. - 90.
T3	32.0	25.0 - 35.0
FTI (T4T3)	102.	87. - 297.

Abnormal Test	Value	Normal Range	St Dev Away From Normal
PBI Low	3.0	4.0 - 8.0	2
T4 Low	3.2	3.5 - 8.5	1
FTI (PBIT3) Low	96.	100. - 280.	1

The free thyroxine index PBI times T3 is abnormal. Since it is more reliable than PBI or T3 it is being used to consider diagnostic possibilities.

The free thyroxine index T3 times T4 is normal, indicating that the patient is euthyroid.

Low T4 may be due to anti thyroid drugs, T3 therapy (cytomel), Dilantin high doses of salicylates, testosterone, ACTH, corticosteroids, diseases depressing thyroxine-binding globulin, hereditary thyroxine-binding deficiency.

FTI (PBIT3) and FTI (T3T4) disagree. Because of possible iodine contamination FTI (T3T4) will be used.

Possibilities

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 5—Thyroid pattern of 55-year-old woman. Note that PBI x T-3 is slightly low, but T-4 (M-P) x T-3 in low borderline range. In situation like this, only physician can judge if patient is hypothyroid.

LABORATORY LETTER

Normal Tests	Value	Normal Range	
Calcium	9.3	8.6 - 10.3	
Phosphorus	4.4	2.2 - 4.5	
Glucose	97.	74. - 128.	
Bun	13.0	7.3 - 24.2	
Uric Acid	5.3	2.2 - 7.9	
Bilirubin	1.0	.2 - 1.1	
Cholestrol	217.	153. - 293.	
Triglyc	127.	10. - 190.	
Total Prot	6.7	6.1 - 7.9	
Albumin	3.6	3.3 - 4.9	
Globulin	3.1	1.8 - 3.6	
A/G Ratio	1.2/1	.8 - 1.9	
LDH	156.	101. - 231.	
SGOT	18.	8. - 48.	
ALK Ptase	87.	25. - 100.	
Abnormal Test	Value	Normal Range	St Dev Away From Normal
FTI (PBIT3) High	693.	100. - 280.	10
PBI High	16.5	4.0 - 8.0	9
FTI (T4T3) High	542.	87. - 297.	5
T4 High	12.9	3.5 - 8.5	4
T3 High	42.0	25.0 - 35.0	3

The free thyroxine index PBI times T3 is abnormal. Since it is more reliable than PBI or T3 it is being used to consider diagnostic possibilities.

The free thyroxine index T3 times T4 is abnormal. Since it is more reliable than T3 or T4, it is being used to consider diagnostic possibilities.

Possibilities

Hyperthyroidism

High: FTI (PBIT3) FTI (T4T3)

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 6—Hyperthyroidism pattern.

PBI value is 51.0

A value over 20. suggests iodine contamination. This test is being ignored.

Possible sources of contamination

Large doses of inorganic iodides

Lugols solution

Organic iodide compounds

Iodothiouracil

Dithiazonine iodide

Floraquin

Vioform

Cough syrups

Vitamins containing iodine

Xray contrast media

Duration of interference

Cholografin 4 Mo

Diodrast 2 Wk

Hypaque 1 Wk

Lipiodal 5 Yrs+

Pantopaque 6 Mo

Telepaque 5 Mo

Dionosil 5 Mo

Urokon 1 Mo

Teridax Years

Priodax 4 Mo

Orabilex 2 Mo

Biligradin 1 Mo

To evaluate thyroid function we suggest T4 by Murphy-Pattee and T3.

Free thyroxine index FTI (T3T4) is calculated as T3 times T4 Globulin is calculated as total protein—Albumin A/G ratio is calculated

Normal Tests	Value	Normal Range	
Calcium	9.7	8.6 - 10.3	
Phosphorus	3.7	2.2 - 4.5	
Glucose	101.	73. - 125.	
Bun	11.0	5.5 - 22.7	
Uric Acid	4.6	2.0 - 7.6	
Bilirubin	.6	.2 - 1.1	
Cholestrol	172.	144. - 283.	
Triglyc	114.	10. - 190.	
Total Prot	6.4	6.1 - 7.9	
Albumin	3.5	3.4 - 5.0	
Globulin	2.9	1.8 - 3.6	
A/G Ratio	1.2/1	.9 - 2.0	
LDH	143.	87. - 219.	
SGOT	15.	8. - 48.	
ALK Ptase	84.	15. - 90.	
T4	6.5	3.5 - 8.5	
FTI (T4T3)	234.	87. - 297.	
Sodium	140.	135. - 147.	
Potassium	4.3	3.5 - 5.5	
Abnormal Test	Value	Normal Range	St Dev Away From Normal
T3 High	36.0	25.0 - 35.0	1

All abnormal tests are borderline and may be physiological and clinically insignificant.

The free thyroxine index T3 times T4 is normal, indicating that the patient is euthyroid.

High T3 may be due to liver disease, metastatic tumor, nephrosis, pulmonary insufficiency, aortic stenosis, atrial arrhythmia, diseases that depress plasma protein levels coumadins, androgens, cortisone, large doses of aspirin.

Diagnostic possibilities based solely on tests

Order of list does not imply probabilities

List is not necessarily complete

Fig. 7—Example of printout when PBI contaminated. If this occurs, PBI not used in calculating free thyroid index. Because of frequency and unpredictability of iodine contamination, many laboratories have stopped doing the PBI test.

Minnesota State Medical Association

121st Annual Meeting of the Minnesota State Medical Association will be held in Duluth, May 16 and 17, in the Duluth Arena-Auditorium.

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Book Reviews

WE MAINLINE DREAMS by Judianne Densen-Gerber, J.D., M.D. Doubleday & Company. \$9.95.

Judianne Densen-Gerber, Doctor of Jurisprudence from Columbia University and Doctor of Medicine from New York University, is a controversial woman. "We Mainline Dreams," her story of Odyssey House in New York and now with branches elsewhere, is controversial but fascinating, and worth reading. In its rambling, somewhat "scrapbook" style, it has much to offer the physician. We know so pathetically little about what that book deals with so movingly, so irritatingly, so distressingly. Childhood and adolescent addiction has been Dr. Densen-Gerber's central concern, but in "We Mainline Dreams" that is just one part of a far-reaching sociomedical story.

For the physician, perhaps the most meaningful segment is that written by Dr. Charlie Rohrs, endocrinologist-turned-Medical Director of Odyssey House. He writes: "In school or during their training, doctors aren't taught about addiction except in the same negative way that a policeman sees it. You see the worst aspects and get a picture of addicts as operators, hostile people demanding treatment, criminals, smugglers of drugs onto the ward, people you couldn't possibly identify with and shouldn't waste hospital beds on . . . That's not the way they're seen at Odyssey. Here we see them as human beings who have a sickness that's different from other people's. I learned to consider the drug addict as a person with a treatable disease rather than someone sub-human. . . . The concepts of a therapeutic community like Odyssey House are applicable to absolutely everybody. There's no one who couldn't benefit from it, and I'm including the professional class most definitely. The addicts aren't people who can't function, as is so often expressed. They function very well, manipulating and exploiting to change situations to suit themselves. The problem is their functioning isn't constructive functioning. Their tragedy is that they destroy other people—every single patient in his program has torn his family to pieces—and in the process of destroying others, they destroy themselves. They problem-solve in an inadequate way rather than a healthy way. And so do many others in society who are considered well."

There is an idea current in medicine—in much of society, for that matter—that active concern with addicted

people demands that the non-addicted people be completely accepting and totally permissive. Listen a bit more to Charlie Rohrs: "The basic pathology in most addicts is that they treat other people as objects, not as persons. They are insensitive to other people's feelings, and therefore they can't monitor their own conduct by the pain they may cause other human beings. In short, they don't care . . . We have to supply values . . . Here, we tell (the addict) that he has to pay the consequences. He cannot continue to hurt others. Kindness is withheld when kindness is not deserved. He can't get well unless we make demands, and we can't treat him unless he faces reality."

The story of addiction is a sordid story, and most of us will choose to go on ignoring it, if not actively avoiding it. For those who choose otherwise, this book should provide a few broadening and disturbing hours.

R. G. B. Bjornson, M.D.
St. Paul, Minnesota

ON ACID HUMOR ARISING FROM FOODS AND ON WHITE MAGNESIA. By Joseph Black, 1754. Translated by Thomas Hanson, 1973.

This small book is a translation from the latin of the inaugural medical dissertation by Joseph Black, a physician who became one of the celebrated chemists of the 18th Century. The first portion is devoted to an essay on digestion as it was understood at that time, and the second portion to an analysis of the properties of magnesium carbonate. In this thesis, Black describes the experiments which eventually laid to rest the phlogiston theory and led to the discovery of carbon dioxide.

It is one of the first experiments utilizing a balance for quantitative chemical analysis, and has been described as being second in importance only to Newton's "Optics" as a model for philosophical investigation. It is one of the milestones in man's understanding of himself and the world which surrounds him.

This translation was accomplished to commemorate the 75th birthday of Professor Owen Wangersteen. It is amply annotated and may be read with little difficulty.

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Reinhold O. Goehl, Jr., M.D.

DECEMBER, 1973



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Contraindicated: Known hypersensitivity to the drug. Children under 6 months of age. Acute narrow angle glaucoma; may be used in patients with open angle glaucoma who are receiving appropriate therapy.

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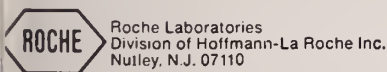
Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

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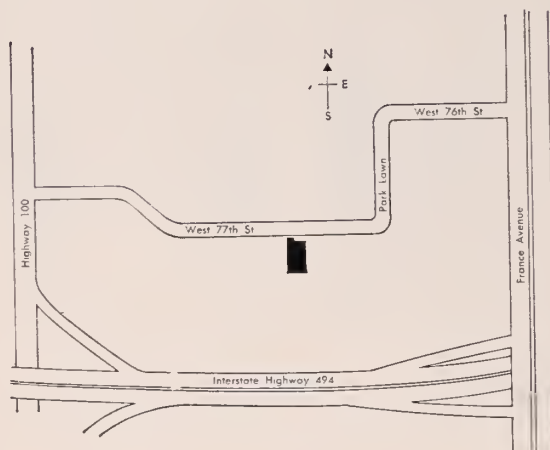
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Warnings: Age, weight, dosage, duration of therapy, existence of concomitant diseases, and concurrent potent chemotherapy affect incidence of toxic reactions. Carefully instruct and observe the individual patient, especially an aging (forty years and over) who have increased susceptibility to the toxicity of the drug. Use lowest effective dosage. Weigh potential unpredictable benefits against po-

tential risk of severe, even fatal, reactions. The disease condition itself is unaltered by the drug. Use with caution in first trimester of pregnancy and in nursing mothers. Drug may appear in cord blood and breast milk. Serious, even fatal, blood dyscrasias, including aplastic anemia, may occur suddenly despite regular hemograms, and may become manifest days or weeks after cessation of drug. Any significant change in total white count, relative decrease in granulocytes, appearance of immature forms, or fall in hematocrit should signal immediate cessation of therapy and complete hematologic investigation. Unexplained bleeding involving CNS, adrenals, and G.I. tract has occurred. The drug may potentiate action of insulin, sulfonamides, and sulfonamide-type agents. Carefully observe patients taking these agents. Nontoxic and toxic goiters and myxedema have been reported (the drug reduces iodine uptake by the thyroid). Blurred vision can be a significant toxic symptom worthy of a complete ophthalmological examination. Swelling of ankles or face in patients under sixty may be prevented by reducing dosage. If edema occurs in patients over sixty, discontinue drug.

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Statement on Antisubstitution Laws and Regulations

The purpose of this statement is to affirm the support of the participating organizations for the laws, regulations and professional traditions which prohibit the unauthorized substitution of drug products.

Traditionally, physicians, dentists and pharmacists have worked cooperatively to serve the best interests of patients. Productive cooperation has been achieved through mutual respect as well as a common concern for the ideals of public service. This mutual respect has been fostered, in part, by joint support over the years for the adoption and enforcement of laws and regulations which prohibit unauthorized substitution and encourage joint discussion and selection of the best drug supply of drug products. The basic principles of medical, dental and pharmacy practice are thus maintained and preserved in the interest of patient welfare.

The antisubstitution laws have obstructed enhancement of the professional status of pharmacy any more than they have in and of themselves guaranteed absolute protection from unsafe drugs, or freed physicians, dentists and pharmacists from their responsibilities to patients. A practical matter, however, such laws and regulations encourage interprofessional communications regarding drug product selection and assure the profession the opportunity to use fully its expertise in drug selection to the advantage of patients.

Physicians and dentists should be urged to increase the frequency and regularity of their contacts with pharmacists in selection of quality drug products, recognizing that

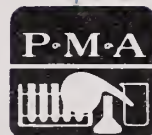
economies to patients can be improved through such communication, taking into account the patients' needs. The pharmacist's knowledge of the chemical characteristics of drugs, their mode of action, toxic properties and other characteristics that assist in making drug selection decisions should be utilized to the fullest extent practicable by physicians and dentists in serving their patients.

Since drug product selection entails knowledge derived from clinical experience, the physician's and dentist's roles in product selection remain primary and do not permit delegation of decisions requiring medical and dental judgments. A broader role in therapy will evolve for pharmacists as improved understanding and cooperation among the professions continue to grow.

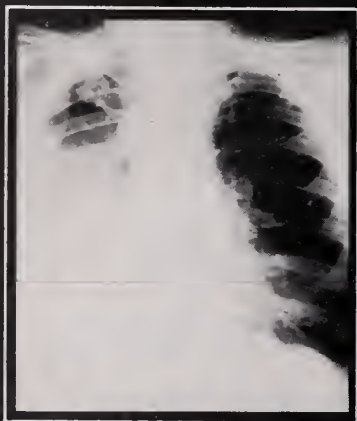
There has been no evidence that there are convincing reasons to modify or repeal existing laws and regulations prohibiting the unauthorized substitution of another drug product for the one specified by a prescriber. It is our belief that such laws and regulations merit the joint support of the medical, dental and pharmaceutical professions and the pharmaceutical industry.

Add your opinion to the weight of other professionals and send it to your state assemblyman or legislator.

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President's Letter

HMO

The other evening my friend, Ted Sweetser, said to me as we were leaving the Medical Arts building, "What would you think about an HMO restaurant?" To one who in his youth expressed reproductive capacity with somewhat greater than average enthusiasm, the notion is intriguing. Indeed, what about an HMO grocery store, or an HMO shoe store, or an HMO University of Minnesota where for one fee all the children would be educated; or an HMO automobile industry where all the ills that beset one's car could be remedied for a single, annual fee, or indeed an HMO government where each of us could pay an identical annual fee for whatever government services were needed.

The fact is that this egalitarian ideal, while attractive in some ways during periods of great need, is not so attractive during periods of great contribution. Thus, many who by dint of good fortune or good education or good effort earn somewhat more than neighbors, contribute more taxes for the same or possibly even less public services. So, in the public sector one pays according to ability and receives according to need. The HMO concept is that each one pays the same but receives in varying amounts.

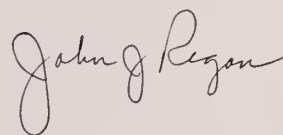
The general HMO concept may have value but how can this be determined without study. The great rush to set up a new system of medical delivery without extensive survey of the old or research into the new seems ill-advised. It was Will Durant in "The Story of Civilization" who pointed out that with evolution or revolution man arrives at the same place at about the same time. So why the bloodshed? If evolution of a social institution produces the same result in improvement of that institution why not let evolution run its course?

That seems to be what is happening in the medical system. Some of the changes we have seen have been for the better. Not all have. Some of the problems that exist in the distribution of medical care and in the rising costs of that care can be traced directly to attempts at reforming the system and in developing painless methods of pay-

ing for care. The worker in the factory whose medical care is paid for by an employer may not directly write a check to Blue Cross or Blue Shield but this cost is a result of his work. At the same time his abuse of that system for paltry or nonexistent causes contributes enormously to the cost and comes, if not directly, at least indirectly out of his toil and sweat. The point is that not all reforms are good reforms. Not all revolutions are good revolutions but that most evolution is a pretty good way at arriving at the desired long term goal.

None of us could criticize the general medicare concept that the oldsters in our population deserve care. All of us can criticize many of the methods used to deliver that care and many of the injustices that are being perpetrated in the guise of concern for our senior citizens. The deprivation of those citizens of their own privacy, the denial of claims for certain kinds of care, the abdication of medicare's responsibility for the very real needs of many of these folks for long term custodial management when the neurons have faltered and the orientation is deficient would be reprehensible in the private sector and certainly is more reprehensible in the public sector.

So, if we overcommit ourselves immediately to some revolutionary system which is not only untried but certainly unproved, we may find ourselves at some distant future date longing for the good old days when there were less bureaucrats, less clerks, less actuarial experts and less politicians involved in the dispensing of care to the sick.



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Respiratory Failure in Influenza Pneumonia

Treated with Membrane Oxygenator

E. SPENNY, M.D.,* S. GESUNDHEIT, M.D.,* P. GANNON, M.D.†
and E. LINDBERG, M.D.†

MEMBRANE OXYGENATORS have been in clinical use for several years as part of the system for extracorporeal circulation in open-heart surgery.¹⁻³ More recently membrane oxygenators have supported patients in profound acute respiratory insufficiency.⁴⁻⁶ They produce less blood trauma than other oxygenators, permitting perfusions lasting several days.

Influenza pneumonia has been responsible for cases of periodic fulminating diffuse pneumonia

producing acute respiratory insufficiency and death.⁷ Three such cases were subjected to venovenous perfusion with a membrane oxygenator⁴ with temporary improvement but all three ultimately succumbed.

This case illustrates that it is possible to effect recovery in profound respiratory insufficiency using venoarterial perfusion with a portable membrane oxygenator in a community hospital.

Case Report

A 46-year-old man was admitted to Unity Hospital, Fridley, on February 1, 1972, with the chief complaint of progressive shortness of breath and coughing. He had been seen three days earlier by his private physician. A

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Request for reprints should be sent to Dr. Edward Spenny, 3620 Central Avenue Northeast, Minneapolis, Minnesota 55418.



Fig. 1—Portable chest film immediately after tracheostomy on evening of admission showing diffuse bilateral opacities.

chest film at that time showed minimal right lower lobe infiltration, and a leukocyte count was 8,700 with 88% polymorphonuclear leukocytes. Ampicillin 250 mg. four times daily was prescribed. However, his symptoms progressed.

On admission he had marked cyanosis, fever of 39°C., respiratory rate of 40, radial pulse of 120, bilateral moist rales and distended neck veins. Oxygen administration was ineffective due to restlessness and disorientation. The blood arterial oxygen tension was 33 mm.Hg. and his cyanotic color deepened with paroxysms of non-productive cough. During tracheostomy a prolonged grand mal seizure occurred. Copious pink frothy fluid was aspirated from the trachea. The central venous pressure was 23 cm. water; the chest Xray showed bilateral opacities (Figure 1). Following the intravenous administration of morphine sulfate (15 mgm.), furosemide (40 mgm.), digoxin (0.75 mgm.), hydrocortisone (100 mgm.), and phlebotomy (560 cc.), the central venous pressure dropped to 8 cm. of water. A diuresis of 3,200 cc. resulted. After being on the Bennett MA-1 Volume Respirator for 20 minutes with 100% oxygen the arterial blood oxygen tension was 37 mm.Hg. The patient was transferred to the Intensive Care Unit while the membrane oxygenator was assembled at the bedside.* In spite of the use of maximal ventilation of 1000 cc. tidal volume delivering 100% oxygen at 35 cm. water pressure the arterial blood oxygen fell to 27 mm.Hg. His appearance became ashen. The slightest stimulation would trigger paroxysms of coughing. It was concluded that the patient was in imminent danger of asphyxiation and venoarterial perfusion with the membrane oxygenator was instituted after systemic heparinization.

Perfusion was done by cannulating the iliac vein and axillary artery and oxygenation of the blood with two three-meter-square Lande-Edwards Membrane Oxygenators (Figure 2). A constant flow of 1.3 liters per minute was maintained and the patient's condition stabilized. The arterial pO_2 from the left radial artery was 31 mm.Hg. The venous oxygen tension was 20 mm.Hg. and the oxygen tension of the blood leaving the oxygenator was 207 mm.Hg. During this time maximal ventilation was continued with 100% oxygen, 1000 cc. tidal volume with 35 cm. water pressure at a respiratory rate of 20-22 per minute for the next 48 hours.

Initially the heart rate was about 80 with a normal sinus rhythm. The blood pressure ranged from 90 to 95 mm.Hg. systolic. All peripheral pulses were diminished but present. He was maintained on digitalis. The venous pressure was kept between 8 and 14 cm. of water. During the second hospital day, while on perfusion, the heart rate rose to 200 per minute, which was triggered by paroxysms of coughing. With the use of propranolol the rate was reduced to 120. Intermittent tachycardia of 160-180 persisted for 14 hours after perfusion. Bradycardia as low as 20 beats per minute was initiated by tracheal suctioning and coughing. This arrhythmia was corrected with atropine.

After 48 hours using 100% oxygen in the respirator and at a perfusion rate of 1.3 liters per minute, a second

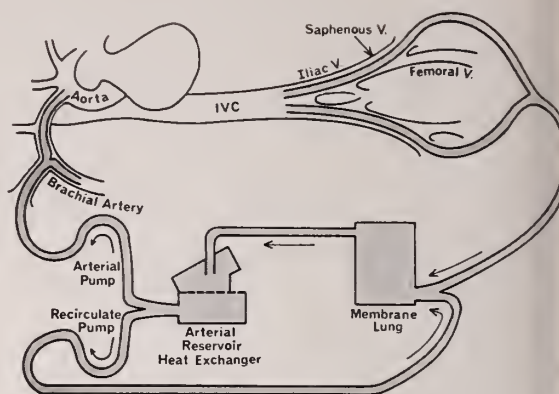


Fig. 2—Circuitry of venoarterial perfusion.

venous catheter was added to increase the venous return. The second catheter doubled the venous return to 2.5 liters per minute. Concomitantly the respirator oxygen concentration was reduced to 80%, at which time the arterial oxygen tension was 48 mm.Hg. Twelve hours later the venoarterial perfusion was gradually reduced and terminated when it was possible to reduce the oxygen concentration in the respirator to 60%. At this point the arterial oxygen tension was 52 mm.Hg. The total perfusion time was 62 hours (Figure 3). Aqueous penicillin (12 million units daily), kanamycin (1 gm. daily), cephalothin (8 gm. daily) and chloramphenicol (2 gm. daily) were given until it was found that his sputum cultures were negative on the fourth day. On the eighth day purulent secretions from the trachea grew *Escherichia coli* and kanamycin (1 gm. daily) was reinstituted. This was later changed to gentamicin (240 mg. daily) when cultures grew *Pseudomonas aeruginosa*. Steroids were administered at this time when an allergic-type rash was observed. Gentamicin (240 mg. daily) was continued from the twelfth to seventeenth hospital day, at which time all antibiotics were discontinued.

In order to maintain an adequate hemoglobin level throughout the perfusion period it was necessary to transfuse 11 units of packed cells and four units of whole blood. The plasma hemoglobin reflected hemolysis due to pumping and oxygenating artificially. The maximum level reached was 15 mg.% at the fourth hour of perfusion and was 7.3 mg.% two hours after termination.

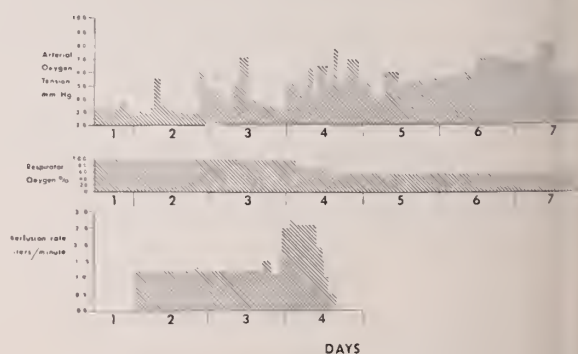


Fig. 3—Relationship of arterial oxygen tension to oxygen concentration in respirator and to flow rate through membrane oxygenator.

*This equipment was transported from St. Joseph's Hospital, St. Paul.

of perfusion. Platelet levels remained above 127,000 and rose to 706,000 nine days after the perfusion terminated. No platelet packs were required. Disseminated intravascular coagulopathy was not found. Fibrinogen levels remained normal. After fifteen days of antibiotics and starvation, bleeding from the trachea occurred and was corrected by Vitamin K therapy.

Significant azotemia was never encountered, even with marked precannulation anoxia. Periodic use of furosemide resulted in prompt urine production and reduction of the central venous pressure to normal levels. Oncotic pressure decrease associated with albumin drop of 3.2 gm.% to 1.8 gm.% on the eighth hospital day was corrected with a total of 300 cc. of salt-poor albumin on the tenth and eleventh hospital days. This prompted marked diuresis.

In order to control paroxysms of coughing daily doses of morphine sulfate (up to 280 mg.), diazepam (60 mg.), chlorpromazine (150 mg. daily), phenobarbital (720 mg. daily) and anectine (up to 250 mg. daily) were required.

He appeared occasionally to comprehend commands. He moved all four limbs. Generalized hyperreflexia with bilateral ankle clonus was present initially. He had pectoralis and masseter muscle twitching later in his hospital course. Serum calcium levels were 7.5 mg.% Intravenous calcium stopped the twitching. Later, calcium therapy was reinstituted as signs of impending tetany appeared. The electroencephalogram during the second hospital day showed diffuse irregular slowing without focal changes.

On the seventeenth hospital day withdrawal from the respirator and sedation were successful. The patient gradually awakened and the tracheostomy tube was removed on the twenty-fifth hospital day. When discharged on the thirty-seventh hospital day, the patient was fully conscious, alert and reacting appropriately. His weight was 115 pounds, 40 pounds less than his admission weight (Figure 4).

Discussion

Influenza has been known to appear in wave-like epidemics with excess deaths recorded, especially in 1918, 1951 and 1957.⁷ Eickhoff associated increased morbidity and mortality with individuals over 65 years, pregnancy or with a chronic disease process. The patient in this report was not in any of these groups, but he smoked one package of cigarettes daily for thirty years.

It is known that the Minneapolis area was the site of an epidemic during January and February 1972. Dr. Henry Bauer of the Minnesota State Department of Health recorded monthly influenza cases from November 1971 to April 1972, with peaks in January and February. Influenza deaths for this period went from seven in November to nine in December, 127 in January and 74 in February. Members of the patient's family were also affected by a "flu-like syndrome".

The decision to use the Membrane Oxygenator came when all other conservative measures failed to keep the arterial blood oxygen tension above 30 mm Hg. Early recognition of the deteriorating pulmonary state allowed sufficient time for preparation of the Membrane Oxygenator. Extracorporeal blood flow was increased from 1.3 liters to 2.6 per minute to allow the respirator oxygen concentration to be lowered from 100% to 60%.

Although venovenous perfusion has been described,⁴ and has the advantage of obviating an

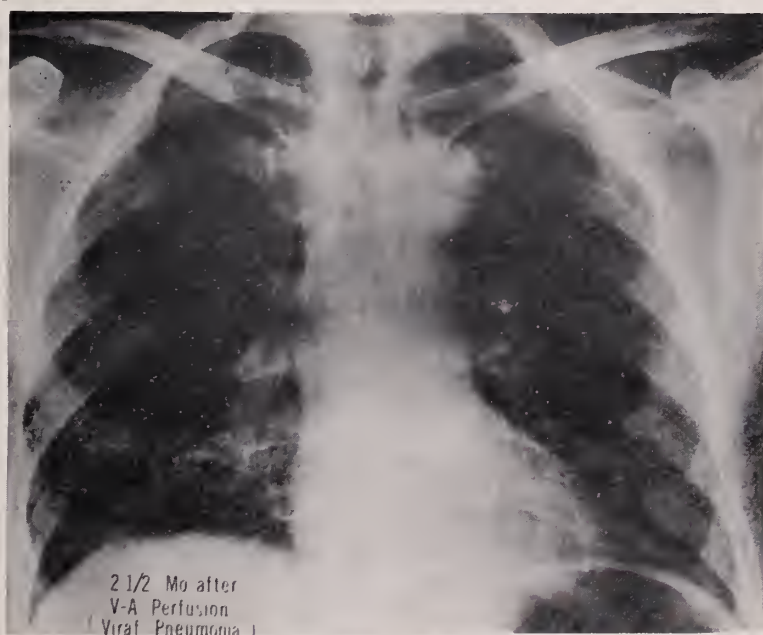


Fig. 4—Upright postero-anterior chest film showing complete clearing of bilateral opacities ten weeks after perfusion.

arterial cannulation, veno-arterial perfusion was used here because it offered a way to perfuse the brain and coronaries with adequately oxygenated blood. It also excluded the lungs from further trauma by particulate emboli which would be filtered out in the lungs by venovenous perfusion. By using the saphenous route to the iliac veins rather than direct cannulation of the femoral veins the necessity of peripheral femoral cannulation to prevent edema was obviated. By using a small cannula distally and a larger one proximally in the axillary artery through one arteriotomy no ischemic changes were noted in the arm distally.

Heparin doses were held to a minimum 4000 units every four hours by adding only that amount of heparin to keep the Lee-White clotting time above 20 minutes. This entailed doing Lee-White times frequently during the 62 hours of perfusion.

Fluid retention was prevented by restricting the intravenous fluids to approximately 100 cc. per hour of 5% glucose in 0.2% saline. Circulating volume deficits manifested by low central venous pressure recordings and anemia evident by low hemoglobin and low hematocrit levels were corrected with 11 units of packed cells and four units of whole blood during the 62 hours of perfusion. The need for this quantity of blood has been previously observed.²

Although antibiotics were used initially, they were discontinued after cultures were negative.

Tracheobronchial superinfection, first with *Escherichia coli*, then *Pseudomonas aeruginosa*, appeared on the eighth and twelfth hospital days. The use of steroids initially and on the eighth day, following the allergic-type rash, may have encouraged this bacterial overgrowth.

Coughing spasms were a constant problem. Influenza leads to intensive mucosal inflammation and was thought to be the main cause for this symptom, especially after the pulmonary edema had decreased.

Influenza complement fixation pre- and post-convalescent titers were 1:64 three days after admission, increasing to 1:512 nine days later. This was considered diagnostic for Influenza-A infection. The patient experienced no respiratory symptoms following hospitalization. He has since returned to his work with no limitations.

Acknowledgments

Special recognition must be paid to the Intensive Care Unit and Operating Room nurses at Unity Hospital, without whose support this endeavor would not have been possible. Recognition also must go to Drs. Brian Campion, Arnold Lande, Irving Katz and Richard Johnson for consultation during the patient's illness. Twenty-four hour supervision of the perfusion was maintained by the cardiopulmonary pump team composed of Sister Victorine Long, M.S., R.M.T. and Thomas Golden, R.N. We also recognize Barbara Kennedy, R.R.A., Director of Medical Record Services, Unity Hospital, for her help in preparing this manuscript and bibliography.

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Minnesota Medicine

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Meeting notices should be in the Editor's hands two months before the anticipated meeting date.

Pseudotumor Cerebri

SIDNEY K. SHAPIRO, M.D.* and IRVING SHAPIRO, M.D.†

PATIENTS PRESENTING with increased intracranial pressure and papilledema present a diagnostic and therapeutic challenge. A rapid complete investigation to determine the cause of the increased intracranial pressure is essential. With increasing frequency, a condition called pseudotumor cerebri is being recognized. The diagnostic criteria for the diagnosis of pseudotumor cerebri are: (1) increased intracranial pressure with papilledema and headache, (2) normal ventricular system as demonstrated by ventriculography and/or pneumoencephalography, (3) increased spinal fluid pressure with a normal cell count and protein in the spinal fluid, (4) absence of other abnormal neurological signs with the exception of diplopia usually produced by one or both sixth nerve palsies and less frequently, by involvement of other cranial nerve palsies.

The electroencephalograms are usually normal except in cases secondary to trauma or infection. Brain scan studies are normal. Some definite causes for pseudotumor cerebri have been established. The Table tabulates the various etiologies of pseudotumor cerebri. After consideration of all known etiologic factors, there is a large group remaining comprising slightly more than one-half of the reported cases of unknown etiology. In this latter group, there is a peak incidence in the 4th decade. There is no history of infection or injury. The largest percentage of patients in this group are females and obesity is mentioned as a frequent clinical feature of the females in this group.

A patient who fulfills the criteria for the diagnosis of pseudotumor cerebri has been encountered and the detailed case report of this patient is felt to be of considerable interest. This patient has been followed by serial fundoscopic pictures to document her progress. The patient also serves to underline the difficulties encountered in the treatment of such a problem.

Case Report

A female patient, age 20, dated the onset of her symptoms to April 1, 1970. At that time, she developed some stiffness of the neck associated with some overhead work and this was followed by headaches, nausea, double vision and blurring of vision.

On examination with the exception of mild nuchal rigidity, the positive findings were restricted to the visual apparatus. The patient had a two to three diopter choke on the left side and a two diopter choke on the right side. There was tortuosity of the veins and slight hemorrhage. On visual field examination, there was barest suggestion of field depression on tangent screen but peripheral fields were entirely full and normal and the blind spots were bilaterally enlarged. There was no spontaneous diplopia noted but with red glass testing, diplopia was elicited in gaze up and to the left and there was noted a mild paresis of the left superior rectus muscle. This paresis was transient and clear within several days. The patient was obese. Routine Xrays of the chest, skull and brain scan and electroencephalogram performed April 6, 1970 all were within normal limits.

On April 10, 1970, bilateral cerebral angiography was performed and was entirely normal. On April 12, a spinal tap was performed. Spinal fluid pressure was 550 mm. with normal cell count and normal protein. On April 20, ventriculography was performed and was negative. On April 28, a pneumoencephalogram was performed and was entirely normal, with good filling of the ventricles and subarachnoid spaces. The medical

TABLE
Etiology

A. Idiopathic.

B. Known Etiology.

1. Superior sagittal or transverse sinus thrombosis.
2. Trauma.
3. Ear Infections.
4. Infections other than in the ears.
5. Complicating steroid therapy with suppression of adrenal cortical secretion.
6. Complicating tetracycline therapy.
7. Vitamin A intoxication.
8. Pulmonary insufficiency
 - a. "Pickwickian Syndrome"
 - b. Cystic fibrosis.
9. Miscellaneous.
 - a. Severe menstrual edema.
 - b. Oral contraceptives.
 - c. Histotoxic anoxia.
 - d. Iron deficiency anemia?
 - e. Endocrine abnormality.
 - f. Hypoparathyroidism?

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assessment of this patient was negative except for a uric acid of 10.

The patient was started initially on a program of fluid restriction and Osmoglyn six ounces every 12 hours. This was given over ice using a large straw and no fluids were given for three hours after each ingestion, with the fluids being restricted totally in a 24-hour period to 1000 cc. Dramamine 50 mg. by hypo was used every six hours as necessary for nausea. On May 11, the Osmoglyn was increased to three times a day. On May 18 the patient was put on a salt free diet and fluid intake was cut down to 700 cc. per day and 800 calorie diet started. In spite of these measures, the papilledema increased and the patient developed fresh hemorrhages in the eyes (See Figure 1). On May 22 Decadron 2 mg. three times a day by injection was commenced. Following this addition to the therapy, there was a gratifying improvement in the papilledema and it gradually decreased. Fresh hemorrhages no longer occurred and a repeat spinal tap on June 2 revealed that the pressure had dropped to 230 mm. of water. The Osmoglyn 6 oz. three times a day and the Decadron 2 mg. three times a day by mouth were continued on an outpatient basis. The patient received amphotoil 2 tbsp. three times a day. The patient gradually improved on this regime. The Decadron was gradually decreased to .5 mg. three times a day and on October 15, the Osmoglyn was discontinued. Decadron was gradually decreased to .5 mg. twice a day, commencing November 16 and on December 3, decreased to .5 mg. daily.

The patient while on Decadron developed an increasing hypertension with values reaching on March, 1, 1971 to 210/150. Decadron was discontinued on that date. The hypertension gradually subsided and a final evaluation of her eye problem revealed a complete resolution of the papilledema. When rechecked on June 17, the hyperemia and edema had cleared and the fundoscopic photos were normal (See Figure 2). Visual fields showed a normal outline and a normal blind spot. The patient was discharged from further neurological care having apparently made a complete recovery.

Discussion

The literature on this subject is confused by

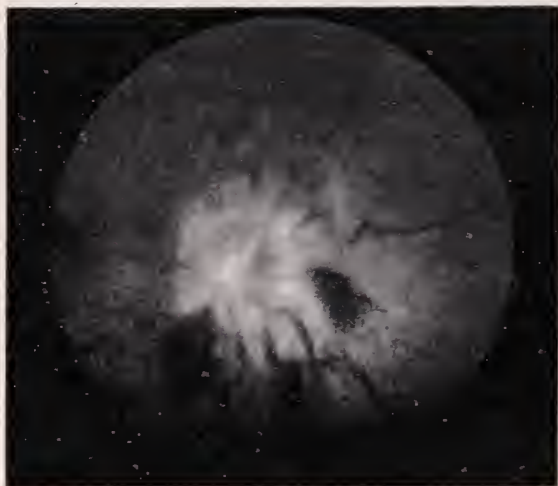


Fig. 1—Papilledema due to pseudotumor cerebri.

the various names applied to the same condition. Pseudotumor, serous meningitis, serous arachnoiditis, chronic arachnoiditis, otic hydrocephalus, toxic hydrocephalus, and benign intracranial hypertension have been used as synonyms for pseudotumor cerebri.

Reviews by Davidoff,¹ Sahs and Joynt,² and Frenkel³ serve to outline the historical background and the problems encountered in the diagnosis of pseudotumor cerebri. Davidoff was able to report 89 cases which included 61 of his own which met the criteria for pseudotumor cerebri of unknown cause. He also reported on a number of cases preceded by ear and mastoid infection and other cases associated with infection or trauma elsewhere in the body.

In the patients comprising the Davidoff's experience in the group of no known etiology there were 18 females and 11 males. In three of the 18 women, unusual obesity was noted. In none was there an association with pregnancy or miscarriage. In the combined group of 89 cases, the frequency of females to males was two to one. Peak incidence was in the fourth decade. Sahs and Joynt² added to the literature cases of cerebral biopsy taken from patients with pseudotumor cerebri and were impressed with the profound swelling present in the material obtained from these cases. Ten such cases were studied and intracellular and extracellular edema was demonstrated. On occasion angiographic visualization of the superior longitudinal sinus is indicated if superior longitudinal sinus thrombosis or thrombosis of one of the lateral sinuses is suspected. Ray and Dunbar⁴ called attention to the observation that obstruction of the sagittal sinus alone or in con-

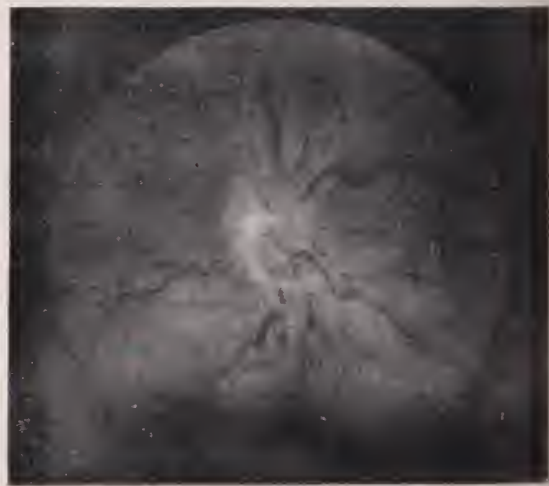


Fig. 2—Normal disc following response of pseudotumor cerebri to treatment.

junction with the transverse sinus or obstruction of both transverse sinuses with sparing of the sagittal sinus could produce an increase in intracranial pressure.

The treatment of pseudotumor cerebri requires individualization of treatment. As in our patient, salt reduction and the use of Osmoglyn should be attempted initially. If there is a failure to respond, the addition of Decadron may produce additional benefit and in many instances, this regime will cause a resolution of the papilledema and effect a cure. In a majority of instances, the threat to vision is not great and the treatment can be handled along the conservative lines as outlined in this patient. On occasion, it is necessary to resort to heroic measures such as subtemporal decom-

pression to save the vision. This procedure, however, is in itself not without some risk, as such intervention may precipitate an acute loss of vision according to Hollenhorst.⁵

In following the progress of treatment in this patient, repeated fundoscopic pictures were obtained and were of immeasurable value in documenting the patient's response to treatment. The most striking of the photographs have been reproduced (See Figure 1 and Figure 2). Figure 1 represents the papilledema at its maximum while Figure 2 shows the excellent result from treatment with the complete resolution of all fundoscopic pathology. This technique is recommended so as to document objectively the various stages of the papilledema encountered in this condition.

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Annual Meeting Preparations Underway

John J. Regan, M.D., *President* of Minnesota State Medical Association announces the appointment of *Robert D. Semsch, M.D.* as Chairman of the Scientific Assembly Committee.

The Range Medical Society and St. Louis County Medical Society, the hosts for our 1974 annual meeting, have begun the task of planning the local arrangements for the Duluth meeting. Named to the Local Arrangements Committee are: *William Jacott, M.D.*, Chairman; *Franklin Johnson, M.D.*, Banquet, Hospitality, Transportation; *William Slack, M.D.*, Public Relations; *Donald VanRyzin, M.D.*, Registration and Reservations; *Thomas Stolee, M.D.* Scientific Exhibits; *Max H. Berns, M.D.*, Bridge Tournament; *Andrew Reardon, M.D.*, Golf Tournament; *Joseph Leek, M.D.*, Tennis Tournament.

Drs. Pearson and Schimelpfenig Honored at Medical Staff Meeting

Dr. Bror Pearson and Dr. Ted Schimelpfenig were honored at the September Medical Staff Meeting at St. Francis Hospital. Both physicians practiced in Shakopee and Chaska before St. Francis Hospital opened and have been affiliated with St. Francis Hospital Medical Staff for 35 years. An award of appreciation was presented to them for their outstanding contribution to St. Francis Hospital and for their loyalty and dedication in the service of the sick.

Surgical Treatment of Lung Cancer

Five-Year Follow-up of 266 Patients*

JOSIAH FULLER, M.D.†

WHEN THE OVERALL experience with a lethal disease is unfavorable, we tend to become so discouraged with the available treatment that we forget in selected cases lives can be saved. Carcinoma of the lung has such a reputation because statistics are compilations of an increasing number of deaths. A careful follow-up of many surgical series will show that early operations of bronchogenic carcinoma yield results that compare favorably with most internal cancers.

The following is a study of all patients with cancer of the lung who had a thoracotomy by the author from 1953 to 1966. There were 276 patients; 266 (96%) were followed for five years or to death and are the subject of this paper. This excellent follow-up is due to the persistence of the medical records personnel in the Duluth hospitals, the Duluth Clinic and the Duluth Tumor Registry. Survival rates shown are determined from the date of operation. All deaths, whether operative, postoperative or from any cause, were included.

The average age of the patients was 59 years, although 72% of the patients were in the sixth and seventh decades of life, three were in their thirties and one was 82 years old.

Seventy percent of the patients had a pulmonary resection for their carcinoma. As shown in Figure 1, 36% of the 187 patients lived for five years, while all patients who did not have a pulmonary resection were dead in less than three years. Pneumonectomy was done when necessary; more limited pulmonary resection was performed whenever it offered an adequate cancer operation because of the peripheral location and limited extent of the lesion. Operative mortality for the two procedures was comparable; 11% for pneu-

monectomy and 10% for lobectomy. Figure 2 indicates a five-year survival rate of 30% for patients who had pneumonectomies and 45% for those who had lobectomies or a lesser resection.

Forty seven of the 266 patients subjected to thoracotomy were female. This small group had a significantly better five-year survival; 43% contrasted with 25% for the entire group.

The histologic classification of cancer of the lung had significant clinical implications. As shown in Figure 3, the resectability rate of squamous cell carcinoma was 80%, adenocarcinoma

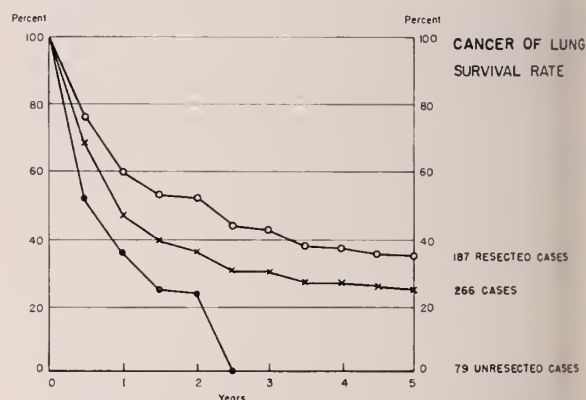


Fig. 1—Survival of resected cases compared with unresected.

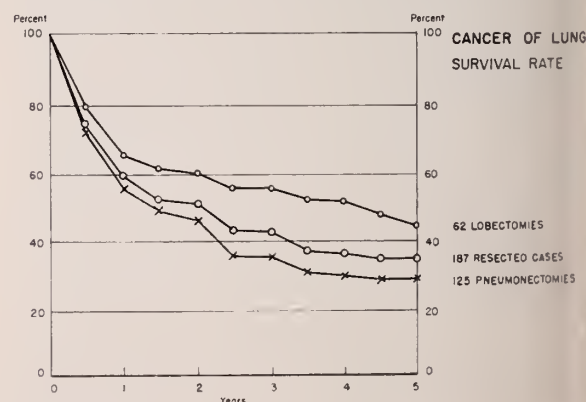


Fig. 2—Survival of lobectomies compared with pneumonectomies.

*Presented to the Annual Meeting of the Minnesota State Medical Association, Rochester, Minnesota, May, 1972.

†Clinical Associate Professor of Surgery, University of Minnesota, Duluth. The Duluth Clinic, Ltd.

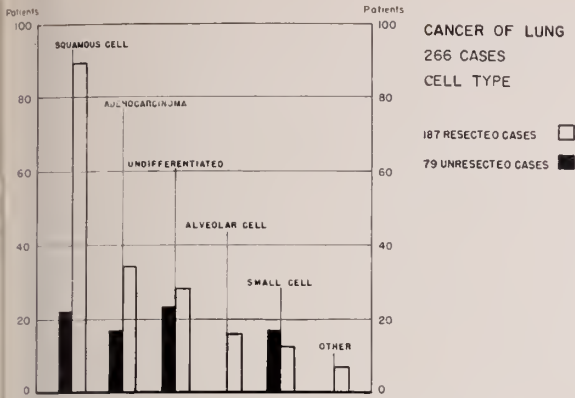


Fig. 3—Influence of cell type on resectability.

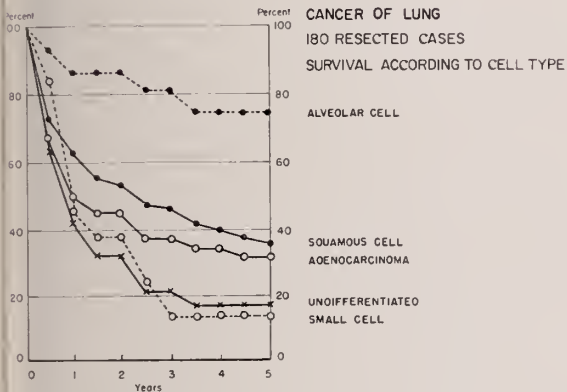


Fig. 4—Influence of cell type on survival of resected cases.

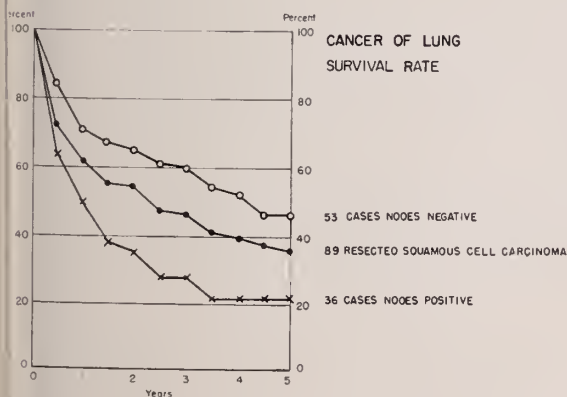


Fig. 5—Influence of metastases to lymph nodes on survival rate of resected squamous cell carcinoma.

67% and alveolar cell carcinoma 100%. Figure 4 indicates a five-year survival for alveolar cell carcinoma patients of 75% while that for patients with squamous cell carcinoma and adenocarcinoma was 37% and 32% respectively.

Patients with small cell carcinomas had a resectability rate of 43% and only two patients lived five years after resection for small cell carcinoma. The diagnosis is always questioned when a patient with small cell carcinoma survives five years. This is the working diagnosis the surgeon was given at operation. The decision whether to operate upon or resect a small cell bronchogenic carcinoma should be based on the extent of the carcinoma. We should not be discouraged from operating, because of a biopsy report of small cell carcinoma for, as this group shows, we may be depriving that particular patient of his only chance for five-year survival.

Undifferentiated carcinoma was only slightly better than small cell carcinoma. Fifty-five percent of 51 patients had a pulmonary resection. Of these, five patients or 18% lived five years.

Seven patients had tumors which would not fit into the classification shown in Figure 4. Three patients had lobectomies for carcinoid tumors and lived five years. Another patient had a pneumonectomy and mediastinal lymph node dissection for an extensive carcinoid tumor and lived 1½ years. A lobectomy was done for a patient with a cylindroma of the bronchus and the patient lived five years. Two patients had sarcomas of the lung; one had a lobectomy and lived three and a half years and the other had a pneumonectomy for an angiosarcoma and died after two years.

The survival rate is significantly better for patients with most cancers when regional lymph nodes are not involved. This also occurred with bronchogenic carcinoma. The five-year survival rate for 36 patients with squamous cell carcinoma with metastases to the lymph nodes was 22% while patients with squamous cell carcinoma with negative lymph nodes had a five-year survival rate of 47% (Figure 5).

Exploratory thoracotomy may be a big operation when nothing surgically can be done. Four percent of the patients who had an inoperable carcinoma found at thoracotomy expired post-operatively. The author believes that the 30% unresectability rate shown in Figure 1 for patients subjected to exploratory thoracotomy is high. For

this reason, I now do an anterior mediastinotomy as described by McNeal and Chamberlain¹ when a lesion might be unresectable. This is a better operation than mediastinoscopy because it allows adequate exploration of the mediastinum to determine operability yet is much less traumatic than thoracotomy. In a recent series of 57 patients, 20 (35%) were unresectable on the basis of anterior mediastinotomy. These patients did not require thoracotomy.

Summary and Conclusions

Of 266 patients who were subjected to thorac-

otomy for cancer of the lung, 25% lived five years; 36% of 187 who had a pulmonary resection lived five years. Of 53 patients with bronchogenic squamous cell carcinoma without metastases to lymph nodes, 47% lived five years.

Although results of surgical treatment of most cancers have a substantial potential for improvement, undue pessimism regarding surgical treatment of cancer of the lung may delay early surgical care and be a real disservice to the patient with this disease.

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Cover Photo

"Nicollet at Christmas"

Dr. Reinhold O. Goehl, Jr. and his wife were having dinner at Daytons with their three daughters several years back when the idea came to snap the cover photo. A Nikon F Camera with a 50 mm lens was used. Dr. Goehl told the Editors he always carries his camera with him as one never knows when an opportunity to snap the unusual might occur. Besides his interest in still life photography, he enjoys taking shots of his family and Minnesota's great outdoors.

A native of Grand Forks, North Dakota, and a graduate of the University of Pennsylvania Medical School, Dr. Goehl began his OB-GYN practice in Minneapolis in 1968. He is a Diplomate of the National Board of Medical Examiners and certified by the American Board of Obstetrics and Gynecology in addition to being a Fellow of the American College of Obstetricians and Gynecologists.

Oliver H. Beahrs, M. D.

Dr. Oliver H. Beahrs, a surgeon at the Mayo Clinic, Rochester, Minnesota, has been elected to serve on the nine-man Board of Trustees of the American Association of Medical Clinics.

The American Association of Medical Clinics, which is the national association representing group practice and group practice physicians, includes in its membership nearly 350 medical clinics and their 12,000 affiliate physicians throughout the United States and Canada.

Osteoporosis

A Six Months Experience At Saint Mary's Hospital, Minneapolis

ROBERT L. WONSAVAGE, M.D.*

THE ROLE OF PRIMARY Idiopathic Osteoporosis as a cause of disability and pain in the elderly is well known. Osteoporosis is a common radiologic finding. Back pain, kyphosis and scoliosis are frequent findings in the elderly osteoporotic. The treatment is largely symptomatic and the physiology of the disorder incompletely understood. The true incidence of the disease in the population is probably unknown and most reports are incomplete, segmental and skewed. It is generally felt that the incidence increases with age and approaches a figure of 25 to 50 cases per 100 persons over the age of 70.

The present study examines the consistency of the above in an unselected series of admissions to Saint Mary's Hospital. Saint Mary's Hospital is a medium sized community hospital that offers a wide variety of services to its patient population and no one subset of patients or medical practice is over represented. A patient profile was constructed and clinical, laboratory, radiologic and therapeutic parameters examined. Success in diagnosis of Osteoporosis was evaluated utilizing the Observed to Expected ratio.

Materials and Methods

This was a retrospective analysis of all primary and secondary diagnoses of Osteoporosis at Saint Mary's Hospital during the first six months of 1971. All data generated are derived from the clinical records of the 25 patients diagnosed as osteoporotic for that period.

Information such as age, sex, height, weight, laboratory studies and findings were merely recorded as such. Simple statistical analysis to determine mean values and/or percent of patients with a given result or study were compiled in the usual manner.

Examining historical data several arbitrary criteria were established in assessing whether a pa-

tient had a history and/or physical findings suggestive of Osteoporosis. A history was deemed suggestive if any of the following were present: back pain, other skeletal pain, known diagnosis of Osteoporosis, multiple fractures in the past or recent fall with back or other pain. Physical exam was considered suggestive if mention was made of pain elicited over or along side of the spine or other boney areas, or associated muscle spasm noted, or if fracture (other than compression fracture) was present.

All chest films were reviewed by a radiologist and initial and final interpretations compared for concordance.

In evaluating therapy, patients were divided into two categories; those who received no therapy for their Osteoporosis and the remainder who received any. With respect to physical therapy no special analysis of the modalities employed was attempted only whether or not the patient received such therapy.

In looking at incidence it was necessary to average figures from several sources to arrive at a new incidence for each age category.¹⁻³ Undoubtedly these figures were incomplete and artificial but served for the purpose of this study as a range. Moreover, it allowed us to examine our own age specific incidence and estimate our skill or lack of same with this diagnosis.

Results

PAS Charts

Utilizing the hospitals Professional Activity Study Charts, 27 diagnoses of osteoporosis were found at Saint Mary's Hospital for the first six months of 1971. These 27 diagnoses reflect 27 hospitalizations for 25 patients. The Professional Activity Study charts listed nine as primary and 18 as secondary diagnoses. Upon close review of these charts 14 primary and only 13 secondary diagnoses were found. The confusion stems from the practice of recording various fractures as diag-

*St. Mary's Hospital, Minneapolis, Minnesota.

noses separate from osteoporosis, in those instances where the former were secondary. All 25 patients had Primary Idiopathic Osteoporosis.

Patient Profile

Primary Idiopathic Osteoporosis is primarily a disease of the aged. In the present study no patient younger than 50 years of age was found and only three in the 50 to 59 year range (Table 1). Our youngest patient was 56 and our oldest 91. The mean age in our patients was 68.

TABLE 1
Age & Sex Distribution

Age	No.	F	M
< 50	0	0	0
50-59	3	3	0
60-69	6	4	2
70-79	5	5	0
80+	9	8	1

The majority of our patients were female (22 of 25). Because of the abundance of females and the supposed importance of estrogen in this disease, an attempt was made to look at parity; unfortunately, data on parity was available for only four of 22 women (18%), and no useful analysis could be made.

Weight and height data were available for 44% and 40% of the patients respectively. The mean height of these people was approximately 64 inches, and their mean weight was 139 pounds. Two patients weighed more than 200 pounds, totally deleting them did not appreciably change mean weight.

It would thus seem that we might adopt the ever popular little old lady as our typical osteoporotic patient.

Historical and Physical Findings

Histories and physical examinations were done on all of these patients. On close review of these histories and physicals it was found that 88% of the patients had a history suggestive for Osteoporosis. The commonest complaint was low back pain frequently of long duration (Table 2). Interestingly, only 41% of the physical exams mentioned findings suggestive of osteoporosis; chiefly spinal and para spinal tenderness and muscle spasm. This may mean one of several things: examination was incomplete, suggestive findings were ignored, or a significant number of the patients were either malingering or extremely stoic

and non communicative. It is of further interest that kyphosis or scoliosis or both were found in 64% of the patients. All 16 patients with this finding were properly identified radiologically, only five of 16 were identified on physical exam. It seems apparent that with kyphosis or scoliosis as one of the sole physical abnormalities seen in a large percentage of osteoporotics, it should be searched for vigorously on examination. Indeed this parameter may be a significant indicator or predictor of Osteoporosis in the asymptomatic patient.

TABLE 2
Suggestive History

Back pain	12
Other skeletal pain	6
Diagnosis known	4
Multiple fractures past	3
Recent fall	3

Laboratory Findings

Of the patients studied 100% had had a CBC, UA, serum Ca and Bun. The first two studies reflect a routine that applies to practically every hospitalized patient at Saint Mary's. The latter two may reflect the utilization of a chemistry screening profile rather than a well thought out evaluation of a specific disease entity.

In 70% of the patients a determination of the ESR was made, in 33% thyroid function was evaluated with a variety of tests. Nineteen percent of our population had alkaline phosphatase and 11% serum phosphorus determinations.

In no patient was acid phosphatase, serum creatinine, urinary steroid excretion or vitamin D absorption study done. Among a variety of other laboratory studies only the serum protein electrophoresis was done with any frequency. Forty-one percent of the patients had ELP's, properly reflecting the need to rule out multiple myeloma; all the studies were normal.

Of all the laboratory work done little was found that was consistently abnormal, except for the erythrocyte sedimentation rate and the urinalysis. Eighteen of 19 sediment rates were elevated with a mean of 33 and a range of 17 to 54. Fifteen urinalyses were positive with respect to microscopic findings of hematuria or pyuria, two patients had minimal proteinuria and only one culture proven urinary tract infection was found. Four determinations of blood urea nitrogen were elevated minimally in the 20 to 30 range. Three

patients had mild leukopenia and one a leukocytosis. A single abnormal EMG was recorded.

Radiologic Findings

A most important tool in the diagnosis of Osteoporosis is the Xray, and spinal films are usually indicated. Eighty percent of our patients had spinal films of one sort or another, and in all cases when they were done they were positive. Seventeen lumbar, ten thoracic and six cervical films were obtained. Lumbar films would seem to be the study of choice for screening, especially since only 10% (three of 29) of chest films were read as indicative of Osteoporosis. Twenty percent of these patients had no chest Xray. A variety of other films were done with variable results, only films of the pelvis were consistently positive in these patients (seven of seven).

In further evaluation of the chest Xray as a diagnostic tool in Osteoporosis, a small study was undertaken. Of the original 20 posteroanterior chest films three (10%) were felt to indicate osteoporosis. In all three cases two or three chest films had been done, yet another patient with four films had none that were positive. These 29 films were coded numerically and read by one of the radiologists at Saint Mary's. The question posed was "which of the following films meets your criteria for the diagnosis of Osteoporosis." Seven films (24%) met these criteria for osteoporosis. On breaking the numerical code concordance between original and present readings was zero (Table 3), and there was no overlap as regards positivity or negativity on first and second readings.

TABLE 3
Radiographic Readings

First		Second			
1st	+	3	2nd	+	7
2nd	+	0	1st	+	0
2nd	-	3	1st	-	7

Allowing for the fact that the study was small, the number of readings inadequate and the approach biased, several things are apparent. While it still seems that posteroanterior chest films are not good screening studies, one might expect a positive report between 10 and 34% of the time. This was not achieved. Perhaps the addition of lateral films would increase the pickup of osteoporosis and finally, with the diagnosis under consideration more films may be read as osteoporotic.

Hospital Stay

The mean hospital stay was 16 days with a

range of three to 65. The time necessary for recovery from an acute injury in a patient with osteoporosis is estimated at three to four weeks on the average. In this time most patients not seriously injured should be able to return to a former or near former level of activity and self care. Of course the severity of the patient's injury and the presence or absence of other disease will determine actual length of stay. It is difficult to state what the average stay for osteoporosis should be, but looking at those with a primary diagnosis of osteoporosis, the mean stay was only 11 days, which may be somewhat short. Intensive medical care is only needed in a small number of these patients, and many could spend the majority of their hospitalization in an extended care facility.

Therapy

In evaluation of the treatment these 25 patients received, the following was found: five (20%) received essentially no specific therapy, two of these were instructed to lose weight; one was given a low calorie diet. Of the remaining 20 patients the following therapeutic approaches were used: 60% received physical therapy for variable lengths of time, 50% calcium supplementation, 30% multi-vitamins, 50% received hormonal supplementation (estrogen and/or androgen, two on thyroid), 20% were fitted or refitted for a brace. No one utilized phosphorus supplementation or suggested the use of bed boards. Finally, 13 of 20 were treated with a variety of analgesics and anti-inflammatory agents. Only two of 20 were treated with a combination of calcium, vitamins, hormones and analgesics. Due to the design of this study there was no way to analyze the effectiveness of any of the therapy used. No attempt to utilize newer therapies was made.

Hospital Population and Incidence Study

Primary idiopathic osteoporosis is uncommon before the age of 50. In the sixth decade the incidence rises sharply for women. Approximately

TABLE 4
Incidence Osteoporosis*

Age	% F	% M
< 50	9	3
50-59	22	5
60-69	26	13
70-79		
80+	40	28

*Combined and averaged data (Smith, Gugenheim & Harrison)
Total admissions St.M.H. first 6 months 1971: 9316

20% of women aged 50 have osteoporosis as compared to 5% of the males. By age 70 the percentages are 30% and 20% respectively, and in the eighth decade the incidence is equal. Good data on actual incidence of osteoporosis is not easily available, but utilizing common estimates of incidence and comparing them with the incidence as determined in other studies¹⁻³ one can arrive at an approximation of the incidence of osteoporosis in each category (Table 4). These figures are probably somewhat conservative, since they reflect a mean of several values or the lowest estimate of incidence available. Comparing then the number of expected cases to the number of observed cases in each age-sex category and examining the observed-expected ratio it becomes apparent that osteoporosis is not being diagnosed in the frequency expected (Table 5).

Even assuming that our estimates of incidence and expected cases are grossly in error, and then reducing the number of expected cases by 90% the observed/expected ratios still fall far short of unity (Table 5).

- hanced.
5. The therapeutic approaches were so varied that they were not evaluable, but perhaps reflect the prevailing therapeutic confusion with respect to this entity.
6. Further, it was found that the only consistent clinical finding in a large number of patients was spinal deformity; the only consistent laboratory abnormality was an elevated ESR—a highly nonspecific test; and lastly, spinal films, especially lumbar films, were essentially diagnostic in and of themselves. The only consistent historical datum was back pain.
7. The entity primary idiopathic osteoporosis was probably underdiagnosed.
8. (a) While in each case analyzed there was sufficient evidence to suggest the diagnosis of primary idiopathic osteoporosis (namely diminished bone density on Xray), other common characteristics of this disease emerged. From this study it appears that the diagnosis is suggested in a female patient in the seventh decade

TABLE 5

Age	No. ADM	No. F	No. M	Observed		Expected		O/E		O/E*	
				F	M	F	M	F	M	F	M
< 50	6178	4016	2162	0	0	361	65	—	—	—	—
50-59	1000	650	350	3	0	143	18	.02	—	.2	—
60-69	915	595	320	4	2	155	42	.03	.04	.3	.5
70-79											
80+	1223	795	428	13	1	318	120	.04	.008	.4	.08

*O/E if incidence and expected 90% wrong.

Summary

1. Specific discrepancies were found between historical complaints of back pain and suggestive physical findings, between radiologic and clinical determination of spinal deformity.
2. Charts were incomplete with respect to data on parity, height, and weight.
3. Laboratory data base was deficient with respect to phosphorus, acid and alkaline phosphatase, creatinine, steroid excretion and vitamin D absorption studies.
4. Posteroanterior chest films were useless in screening for osteoporosis, but with consideration of the diagnosis their value may be en-

presents with a history of back pain and a finding of spinal deformity. The diagnosis is further strengthened if she is short and relatively light weight and if the laboratory is negative with the exception of a moderately elevated ESR. Final confirmation rests with spinal Xrays demonstrating diminished radiodensity.

- (b) These criteria may not be completely valid when applied to a larger population. Examining a larger population may not only refine but further expand these criteria and make early diagnosis of Primary Idiopathic Osteoporosis a reality.

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Meconium Aspiration in the Newborn

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THE BABY WITH meconium in the amniotic fluid is known to be at risk.¹⁻⁵ Syndromes produced by aspiration of meconium by the fetus or newborn are quite variable in severity. Since the majority are reported to be mild and transitory,^{6,7} an attitude of complacency regarding the meconium stained infant often prevails until increasing tachypnea, grunting, and cyanosis a few hours after birth indicate that a serious problem is underway. Personal experience in a referral newborn intensive care unit paralleled that of Kachaner et al, who, in reporting on infants with aspiration syndrome transferred to their intensive care unit, noted a mortality rate of 15% among infants with meconium stained amniotic fluid and 35% among those found to have meconium in the trachea at birth. These authors suggested that more aggressive management should reduce morbidity and mortality of these infants.⁸

This is a report of a two year experience in trying to identify and aggressively treat in the delivery room the infant at risk from aspiration of meco-

nium.

Subjects and Methods

The 101 infants reported were born on the obstetrical service of Hennepin County General Hospital from January 1970 through December, 1971. Fetal monitoring was part of the intensive obstetrical care given high risk deliveries on the service. A fetus was considered at risk if meconium staining of the amniotic fluid was seen at amnioscopy or at rupture of the membranes. A pediatric team was available for care of the infant at delivery. Appropriate measures were taken to avoid chill stress during resuscitation and supportive oxygen and ventilation assistance were given when indicated by cyanosis or poor respiratory effort of the infant.

If meconium stained material was suctioned from the oropharynx, a decision was made whether to intubate the infant and whether to lavage the trachea with saline. Technique for lavage of the trachea has been reported previously.⁹

The infants fell into three main groups according to presence or absence of meconium in the airway (Table 1). Group I included infants who did not have meconium in the oropharynx at initial suctioning and, therefore, were not intubated

TABLE 1
Summary of Data Related to Meconium in the Airway and Method of Clearance of the Airway of 101 Infants with Meconium Stained Amniotic Fluid at Birth

	Number of Patients	Number of Patients with Apgar scores		Initial Chest X-Ray*			Number Given Anti-biotics	Ave. Days Respiratory Distress	Ave. Days Hospital Stay	Mechanical Complications
		Low	High	Clear	Moderate	Severe				
Group I										
No Meconium in Oropharynx	17	0	17	7	3	5	11	4.2(9)	10.0	2 pneumothorax
Group II										
No MIT										
No Lavage	20	5	15	6	10	4	11	0.9(9)	8.9	1 stridor
Imm Lavage	6	3	3	2	3	1	6	1.0(4)	7.0	
Delayed Lavage	8	2	6	3	3	2	5	0.8(6)	11.5	
Group III										
No Lavage	3	2	1	0	2	1	2	2.3(2)	10.3	
Imm Lavage	35	20	15	8	12	15	23	1.1(22)	7.5	1 pneumothorax
Delayed Lavage	12	6	6	0	2	10	12	2.5(11)†	12.8†	3 pneumothorax
Totals	101	38	63	26	35	38	70	1.8(63)†	9.14†	

*one premature with RDS not included and no x-ray in one infant.
†one unusually long respirator case not included.

() number who had respiratory distress.

or lavaged. Group II included infants who were intubated because of meconium in the oropharynx but were found to have no meconium in the trachea. Group III were infants who had meconium stained material suctioned from the trachea at intubation. Some of the intubated infants had suction only to clear the airway (No L), some had suction and lavage immediately at birth (Imm L), and in some, intubation and lavage were delayed 20 minutes or more after birth (DL).

At least one chest X-ray was obtained in 100 infants. In nine cases, X-rays were obtained before and after tracheal lavage. X-ray interpretation was based upon radiological patterns in neonatal aspiration syndrome described by Peterson and Pendleton.¹⁰ X-rays were rated as clear if both heart borders were sharp, no air bronchograms were present, and no linear or flocculent densities were seen in peripheral lung fields. A mild to moderate rating included faint air bronchograms beyond hilar areas with fine linear densities fanning out to the periphery or scattered small areas of nodular densities. Severe involvement included generalized nodular or flocculent densities, obscured heart borders, air bronchograms and focal areas of hyperaeration or complete opacification of the chest X-ray.

A resting respiratory rate of greater than 60 per minute, retracting, or grunting was counted as respiratory distress. In calculating average days of respiratory distress, only infants who had distress beyond delivery room resuscitation were counted.

Cultures were taken and antibiotics given initially at the discretion of house staff. Aqueous sodium penicillin 75,000 units/kg. and kanamycin 15 mg./kg. were used unless change was dictated by clinical course or results of cultures.

Apgar scores were defined as "low" if the score at either one minute or five minutes was

four or less and "high" if both the one minute and five minute scores were five or more.

In considering effects of gestational age, the infants were grouped according to gestational age of 38 weeks or less, 39-40 weeks, 41-42 weeks, and 43 weeks or more.

For infants of 38 weeks or less gestational age, hospital stay was adjusted by subtracting from the total hospital stay that number of days that would have been required for the infant to reach 2500 grams if he had gained 20 grams per day.

Outcome of the infants as measured by average days of respiratory distress and average day of hospital stay was correlated with Apgar score (Table 2), gestational age (Table 3), chest X-ray (Table 4), antibiotic therapy (Table 5), and method of airway clearance (Table 1).

Results

Of the 101 infants who had meconium staining of the amniotic fluid, 84 also had meconium stained material in the oropharynx. Sixty percent (50 of 84) of these had meconium stained material in the trachea (MIT). Occurrence of meconium in the trachea was not related to age of the mother, gestational age or sex of the infant. While some complication of labor or delivery was present for 80 infants and multiple problems were present for 36, only in toxemia (five or six) and breech position (seven of seven) did clinical background appear to have any value in predicting presence of meconium in the trachea.

Apgar Scores

Though there was a definite correlation between low Apgar scores and presence of meconium in the trachea ($p = <0.01$) a high score did not rule out MIT or subsequent respiratory distress. Infants with low Apgar Scores had longer hospital stays (Table 2).

Gestational Age

Apgar scores, chest X-rays, and adjusted hospital

TABLE 2
Relationship of Apgar Scores to Outcome of 101 Infants with Meconium Staining of Amniotic Fluid

Apgar Score	Number of Patients	Number of Infants with			Number of Infants with Initial Chest X-ray*			Number Given Anti-biotics	Ave. Days Respiratory Distress	Ave. Days Hospital Stay
		No M in O	No MIT	MIT	clear	moderate	severe			
Low	38	0	10	28	6	12	20	30	1.7(29)†	10.5†
High	63	17	24	22	20	23	18	40	1.9(34)	8.3

*one RDS not included and one infant had no x-ray.

†long respirator case not included.

() number who had respiratory distress

stay did not differ according to gestational age. The infant of 38 weeks or less was more likely to have positive cultures ($p = <0.001$) and longer periods of respiratory distress ($p = <0.05$) than term or post term infants. There was no difference in occurrence of MIT among infants of different gestational ages (Table 3).

Xrays

The infant with meconium in the amniotic fluid was more likely to have severe findings on chest Xray if he also had a low Apgar score ($p = <0.05$) or meconium in the trachea ($p = <0.02$) (Table 1). Infants with a clear chest Xray had less respiratory distress and shorter hospital stays than infants with severe x-ray findings ($p = <0.05$) (Table 4). In nine patients who had Xrays before and after tracheal lavage, there did not seem to be any worsening of the Xray in these cases and, in seven of nine, there was improvement. Lavage did not seem to be responsible for the severe x-ray findings.

Antibiotics

Antibiotic administration was associated with longer periods of respiratory distress and hospital stay. This appeared to be a function of initial condition of the infant influencing the decision to give antibiotics rather than an effect of antibiotics (Table 5).

Method of Airway Clearance

Respiratory distress occurred just as often and the period of distress tended to be longer in infants who had suction of the oropharynx only as it did in those who were intubated.

If no meconium was present in the trachea, there was no difference in respiratory distress regardless of timing or method of clearance of the airway. If meconium was present in the trachea, the period of respiratory distress was shorter if the infant was intubated, suctioned, and lavaged immediately ($p = <0.001$).

In five cases adequate respirations were established in the delivery room when the infant was

TABLE 3
Data for 101 Infants with Meconium Staining of the Amniotic Fluid Grouped According to Gestational Age and Presence of Meconium in the Airway at Birth

	Number of Patients		Initial Chest Xray		Apgar Scores		Patients Given Antibiotics	Ave. Days Respiratory Distress†	Ave. Days Hospital Stay†
		clear	moderate	severe	Low	High			
38 weeks or less									
gestational age ... (10)									
Group I	3	1	0	1	0	3	3	10.5(2)	12.0
Group II	3	1	1	1	0	3	2	0.6(2)	7.7
Group III	4	0	2	2	2	2	4	2.1(2)†	9.3†
39-40 weeks									
gestational age ... (44)									
Group I	7	3	2	2	0	7	4	1.5(3)	10.4
Group II	18	5	8	5	5	13	9	1.2(10)	9.3
Group III	19	2	6	11	5	14	15	2.5(13)	11.1
41-42 weeks									
gestational age ... (32)									
Group I	4	1	1	1	0	4	3	2.3(3)	7.5
Group II	10	4	5	1	4	6	8	0.8(6)	10.1
Group III	18	6	5	7	10	8	10	1.1(12)	6.6
43 weeks or more									
gestational age ... (15)									
Group I	3	2	0	1	0	3	1	4.0(1)	9.0
Group II	3	1	2	0	1	2	2	0.1(1)	5.6
Group III	9	0	3	6	6	3	7	1.0(8)	8.3

*One premature with RDS not included and one infant had no x-ray.

†One unusually long respirator case not included

() Number in group who had respiratory distress

TABLE 4
Data on 99 Infants with Meconium Stained Amniotic Fluid Grouped According to Initial Chest X-Ray Findings

Initial Chest Xray	Number of Patients	Number with Apgar Scores	Number Given Antibiotics	Average Days Respiratory Distress	Average Days Hospital Stay
		Low	High		
Clear	26	5	21	12	0.8(8)
Moderate	35	12	23	22	0.96(22)
Severe	38	21	17	34	2.6(33)*

*long respirator case not included.

() number who had respiratory distress.

lavaged after intubation and suctioning alone had failed to achieve desired results. In each instance the resuscitating physician noted removal of thick tenacious mucous plugs.

Average length of hospital stay was longer for infants not intubated at all, infants who had delayed clearing of the airway, and those who had low Apgar Scores. For infants with no meconium in the trachea who had high Apgar scores, timing and method of airway clearance did not make any difference in hospital stay. For those infants with no meconium in the trachea but low Apgar scores and all the infants with MIT regardless of Apgar score, the infant had a shorter hospital stay if the trachea was intubated, suctioned, and lavaged immediately at birth. ($p = <0.05$).

Mechanical Complications of Intubation

Only one infant had stridor. This occurred in an infant who had traumatic intubation. Pneumothorax occurred as frequently in those not intubated as in those intubated (Table I). While bradycardia frequently was relieved by intubation and institution of ventilation, no bradycardia secondary to the procedure of intubation was noted.

Deaths

One death occurred in a term infant delivered by emergency C-section for uterine rupture. The infant had low Apgar scores, delayed clearance of meconium from the trachea and tension pneumothorax.

Discussion

Findings of this study indicate that, for infants with meconium staining of the amniotic fluid, the airway will not be adequately cleared by suctioning the oropharynx alone since fifty percent of the infants also had meconium stained material in the trachea. Morbidity as well as mortality appeared to be reduced by more aggressive clearance of the airway immediately at birth. In a recent investigation in which fetal monitoring and obstetrical management were thought to have influenced outcome favorably, Pakzad and Saling reported a death rate of 6.4% among infants

who passed meconium but had no other signs of fetal distress.¹¹ For this study the death rate was 0.99%. Reduction in morbidity was evidenced by shorter periods of respiratory distress and hospital stay found in those infants who were intubated and had the airway cleared promptly at birth compared with those who had delayed clearing of the trachea or suctioning of the oropharynx only.

There is a general reluctance to intubate newborns until after other methods of resuscitation have been tried. Part of this reluctance has stemmed from the high incidence of complications such as pneumothorax often associated with intubation of the infant. Evidence is accumulating that pneumothorax is more likely attributable to pathology that prompts the intubation rather than the intubation procedure itself.¹²

In this study, overall occurrence of pneumothorax was low (6%). Pneumothorax in the intubated infants (4.8%) did not differ significantly from occurrence of pneumothorax in non-intubated infants (11.6%). Nor was there any significant difference when pneumothorax of our intubated infants (two of 84) was compared with occurrence of pneumothorax in intubated infants investigated by Steele et al. (four of 50 infants).¹³ Though the numbers for our study were small, there was a significantly greater occurrence of pneumothorax in our non-intubated infants with meconium in the amniotic fluid (two of 17) than in the infants from routine vaginal deliveries reported by Steele (four of 300 infants) ($p = <0.01$). This suggests that, in infants with meconium in the amniotic fluid, pneumothorax is more likely associated with pathology present than the intubation procedure. These findings also suggest that the infant with meconium in the amniotic fluid is at risk from aspiration even if no meconium stained material is present in the oropharynx at initial suctioning. This concept is further supported by the longer periods of respiratory distress and hospital stay of the infants who had suctioning of the oropharynx only compared with those who were in-

TABLE 5
Relationship of Antibiotic Administration to Outcome of 101 Infants with Meconium Staining of Amniotic Fluid at Birth

	Number of Patients	Number of Patients with Apgar Scores		Number of Patients With Initial Chest Xray			Number of Patients With			Ave. Days Respiratory Distress	Ave. Days Hospital Stay
		Low	High	Clear	moderate	severe	No	Min0	With No MIT MIT		
No Antibiotics Given	31	8	23	14	13	3	6	12	13	0.6(8)	6.0
Antibiotics Given	70	30	40	12	22	35	11	22	37	2.0(55)*	10.4*

*Long respirator case not included.

() number who had respiratory distress.

tubated immediately.

The infants presumed to be at greatest risk from aspiration of meconium stained amniotic fluid were the infants who also had meconium in the trachea at birth. In these infants, prompt clearance of the airway was associated with significant reduction in respiratory distress and hospital stay compared with those who had delayed clearance of the airway. While evidence favored saline lavage as a valuable adjunct to suctioning in clearing the airway, the number of infants with MIT who received suctioning only was too small to permit valid comparisons with those who were suctioned and lavaged. Further work is needed to determine whether intubation and suctioning would suffice just as well as intubation, suctioning and lavage did in this study. Lewinski found that normal saline instillations did not produce inflammatory reactions in lungs of cats.¹⁴ Other studies

have indicated that the recommended technique of lavage does not compromise arterial blood gases.⁹ There was no evidence that any cases in this study were worsened by lavage and some appeared clinically or radiologically improved by the procedure.

It is unlikely that either suctioning or lavage will retrieve any debris already disseminated to the periphery of the lung. Therefore, it would seem advisable to take whatever measures are to be employed before the infant is stimulated to take deep breaths. It is concluded that the infant with meconium staining of amniotic fluid should be intubated immediately at birth for adequate clearing of the airway. Such intubation, carefully performed, should not increase risk for the infant and should improve the outcome. In addition, use of saline lavage to facilitate removal of debris from the trachea is not harmful and may be helpful.

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It's The Law

No Liability for Diagnosis of Psychiatric, Not Somatic, Disorder

A patient was hospitalized for one week for diagnostic work-up because of a number of complaints and symptoms. The physicians concluded that none of the symptoms were organic and that she should seek psychiatric treatment. She then underwent a five week in-patient hospitalization at a neuropsychiatric center.

Three years later another doctor diagnosed chronic right maxillary sinusitis. Following surgery a pulmonary embolus was diagnosed and treated.

The patient contended that the doctors at the first hospital should have diagnosed at least a sinus condition and should have referred her for treatment for that at that time. The psychiatric hospital claimed that its doctors met the proper standards of care in handling the case and that indications of somatic disease were not present at that time.

The patient was denied damages by a California jury.

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Minneapolis, Minnesota

Morey v. Kaiser Foundation Hospitals (Cal. Super. Ct., Santa Clara Co., Docket No. 240601, Nov. 9, 1972. The Citation, 27:10, September 1, 1973.

Immobilized Enzymes

Their Applications in Medicine

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ENZYMES ARE USED routinely in many areas of clinical medicine. Their uses in the clinical laboratory as analytical reagents for measuring small amounts of constituents such as glucose or urea in blood and other biological fluids are well established. Measurement of specific enzyme activities such as serum transaminase and lactic acid dehydrogenase and isozyme patterns of the latter are valuable diagnostic tools. Enzymes are used in a more limited way as therapeutic agents; examples are the use of proteolytic enzymes to digest blood clots and the recent use of the enzyme asparaginase for treating patients with lymphocytic leukemia.

Considering the potential applications of enzymes in these and other areas of medicine their use has been limited. Many potentially useful enzymes (on the basis of their catalytic activities) are quite labile in solution in the purified state, and the preparation of purified enzymes in quantity by the usual procedures is expensive. Recent developments in enzyme technology involving procedures for the stabilization of enzymes by inclusion in or fixation on water-insoluble supports (immobilized enzymes) and the isolation of many enzymes in a highly purified state by the technique of affinity chromatography have demonstrated that the specific catalytic properties of enzymes will no doubt be exploited to a much greater degree in medicine and other fields in the future. The purpose of this article is to illustrate by selected examples some of the procedures employed and possible applications of these techniques in medicine.

Immobilized Enzymes

The majority of the techniques for immobilization of enzymes which have been published in the last few years involve the following types of interactions between the enzyme and an insoluble polymer:^{1,2}

1. Physical adsorption on the solid carrier by non-covalent interactions such as ionic binding to hydrophilic exchange resins.
2. Entrapment of the enzyme inside a polymeric gel. Entrapment occurs by polymerizing the gel in the presence of the enzyme. An important modification of this general procedure is the process of microencapsulation in which an enzyme solution is dispersed in an organic solvent and then polymerization is initiated so that a "gel" membrane is formed around the droplet.
3. Covalent chemical bonding of the enzyme to solid carriers such as porous glass, cellulose, Sepharose (a beaded form of agarose), or other synthetic organic carriers such as poly (ethylene-maleic anhydride). The reaction is usually carried out by converting the support to a reactive form which will react with functional groups on the enzyme which are not essential for catalytic activity (Figure 1).

No standard procedure is available for immobilization of an enzyme; the kind of reaction used in the coupling process and the support material used will depend on the properties of the enzyme and the purpose for immobilization. Obviously the conditions of the coupling process and the type

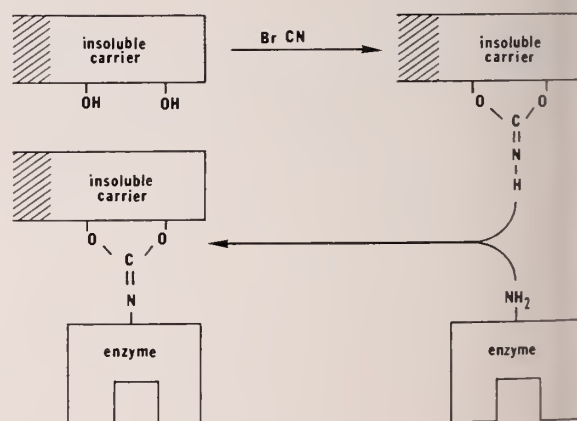


Fig. 1—Illustration of an immobilization procedure involving covalent attachment to an insoluble polysaccharide such as agarose. The polysaccharide is first "activated" by reaction with cyanogen bromide. The free amino groups of the enzyme or other soluble molecule are then reacted with the "activated" polysaccharide to give an insolubilized enzyme.

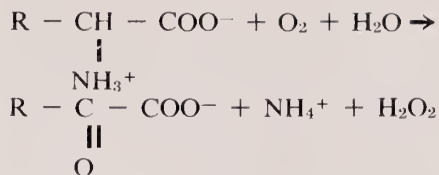
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of reaction employed must be such that the structural properties of the enzyme essential for catalytic activity are not altered and access of the substrates to the catalytic sites of the enzyme are not hindered.

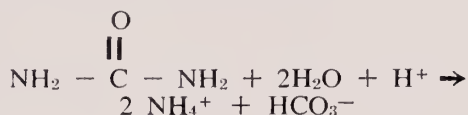
Immobilized enzymes have been found to be more stable than the corresponding soluble enzymes, although the catalytic activities are usually decreased. The immobilized enzymes can usually be used repeatedly thus reducing the need for expensive and constant purification of large quantities of an enzyme for use in a given process, such as, e.g., the conversion of benzylpenicillin to 6-aminopenicillanic acid by the enzyme penicillin amidase. Another advantage is that the enzyme can be removed from the reaction mixture by simply centrifuging or filtering, or the reaction mixture can simply be passed over the immobilized enzyme, e.g., through a column containing the supported enzyme; in either case the reaction product is then free from protein impurities which could lead to allergic reactions if the product was destined for therapeutic use.

A few examples of the applications of immobilized enzymes in medicine will be mentioned here; more extensive reviews of their general use have been published elsewhere.¹⁻³ The applicability of immobilized derivatives of urease and urate oxidase for the continuous and automated analysis of urea and uric acid was demonstrated by Hornby and coworkers.⁴ In their procedure the sample with appropriate additions to the flow stream is pumped through nylon tubes or powders containing bound enzyme and the products of the reaction are measured by mixing with appropriate reagents which react with the products to give a color which is measured by a spectrophotometer inserted in the line. The enzymes retained activity over a long period of time (four months involving 400 analyses in the case of urease) and the results were very reproducible. Similar procedures have been published for the use of glucose oxidase, peroxidase, and some dehydrogenases for analytical purposes in the clinical laboratory.

A very promising application of immobilized enzymes is their use in conjunction with an electrochemical probe (enzyme electrodes).⁵ An electrode specific for L-amino acids was prepared by covering a cation sensitive glass electrode with a gel containing the enzyme L-amino acid oxidase which catalyzes the following reaction :



The cation electrode detects the ammonium ions produced when an amino acid is present, the steady state potential of which is proportional to the ammonium ion concentration in the enzyme layer and, therefore, to the concentration of amino acid(s) in the solution. An electrode for measuring urea by a similar procedure employing urease has also been described; again, the cation electrode detects ammonium ions produced from urea by the following urease catalyzed reaction:



In both of these examples recently developed electrodes specific for ammonium ions could be substituted for the cation sensitive electrode and the CO₂ electrode could also be used with urease.

Asparaginase has been immobilized by covalent attachment to nylon tubing and the resulting immobilized enzyme has been shown to be effective in clearing *L-asparagine* from human blood⁶. Previous studies had shown that microencapsulated *L-asparaginase* injected into the peritoneal cavity or incorporated in an extracorporeal shunt through which the blood could flow was even more effective than the free enzyme in retarding the appearance of lymphosarcoma in mice implanted with lymphosarcoma cells. Although *L-asparaginase* has been shown to be useful in the therapy of acute lymphocytic leukemia in humans, the enzyme, which is isolated from *Escherichia coli*, has undesirable immunogenic side effects, has a short half-life in the plasma due to antibody production, and is prohibitively expensive. The possibility of using asparaginase immobilized to nylon as indicated above in extracorporeal shunts for removal of asparagine from the blood of patients with leukemia is currently being investigated and could eliminate some of these problems.⁶

Immobilized enzymes will very likely be applied in the future to the treatment of enzyme deficiency diseases. Acatasia is the result of a deficiency of the enzyme catalase in human tissues. Mice deficient in catalase die when treated with sodium

perborate but similar mice treated by injections of catalase or with extracorporeal shunts containing microencapsulated catalase are able to detoxify the perborate.⁷ This experimental work with mice suggests that similar procedures as illustrated in Figure 2 might be applicable to humans who suffer from this disease.

Various deficiency diseases related to the digestive process may be very accessible to corrective treatment with immobilized enzymes. Two such deficiency diseases are sucrose intolerance and isomaltose intolerance.⁸ Both of these diseases are digestive disorders and while they can be treated by the avoidance of sucrose and starch, respectively, a possible corrective treatment using immobilized enzymes would enable these individuals to lead a more normal life relative to their diet. This would require the preparation of appropriately immobilized enzymes which would then be ingested with each meal. For example, sucrose could be immobilized on Sepharose beads which could then be encapsulated within a semi-

permeable membrane; immobilization would stabilize the sucrose and encapsulation would protect it from proteolytic action.

Other applications of immobilized enzymes include their use in catalyzing transformations leading to medicinals or synthesis of medicinals (e.g., hydrolysis of benzylpenicillin as mentioned above and the synthesis of poly-I:C, a synthetic ribonucleic acid polymer which is effective in inducing interferon), as models of membranes and metabolic cycles in basic research (in a sense any biological system can be considered as one grand immobilized enzyme system!), and as immuno-adsorbents for the isolation of antibodies to the enzyme (or any antigen).

Affinity Chromatography

The numerous applications in medicine of immuno-adsorbents (immobilized antibodies or antigens) in medicine are discussed in the excellent review by Boguslaski et al.³ The technique of affinity chromatography for the purification of enzymes evolved from the demonstration that specific antibodies could be isolated by passage through a column containing antigen immobilized to a solid support.^{2,9} Purification was achieved because only the desired antibody had a specific and high affinity for the immobilized antigen. All the other proteins (and antibodies) were unretarded and passed through the column; the bound antibody could then be eluted from the column by changing the pH or other appropriate property of the eluting buffer. A characteristic of most enzymes is that they bind to their substrates or substrate analogues specifically and reversibly. The technique of affinity chromatography as applied to enzyme isolation (illustrated in Figure 3) involves selective adsorption of the enzyme to suitable insolubilized molecules (ligands) which can bind specifically to the enzyme (inhibitors, substrates or substrate analogues, antibodies, etc.). The great advantage of this procedure is that it exploits those properties of the enzyme which are its essential characteristics, i.e., the specificity and the physical and chemical behavior of the active sites of the enzyme. Most modern methods of enzyme isolation and purification (fractionation, chromatographic, and electrophoretic procedures) are general but non-specific techniques which permit separations on the basis of differences in protein properties such as solubility, charge, size, and shape and many steps resulting in low yields

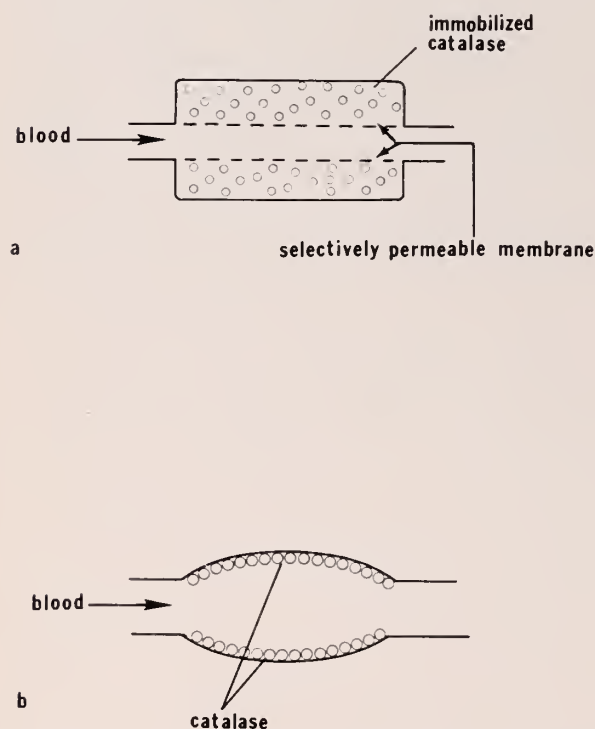


Fig. 2—Two types of shunt devices with possible applications to an enzyme deficient disease such as acatalasia. a) The immobilized catalase is separated from the blood by a selectively permeable membrane (perhaps teflon) which allows H_2O_2 to enter. If the purified enzyme is stable immobilization may be necessary since the membrane would retain it. b) The catalase is immobilized on the walls of the shunt tube (perhaps nylon) and the enzyme comes in direct contact with the blood.

are often involved in the purification process.

Several extensive reviews have been published describing the methodology and applications of affinity chromatography.^{3,9,10,11} As with immobilized enzymes a standard procedure applicable to all situations is not available, although some general guidelines have evolved as a result of the numerous studies carried out in this area. The insoluble carrier must be inert, must be porous to permit penetration of the macro-molecules into the matrix and to permit a good flow rate, must be chemically and physically stable, and must contain sufficient and appropriate functional groups to permit attachment of a reasonably large number of ligands under mild conditions. It has been found that best results are obtained when the ligand is not attached directly to the carrier, but

rather to one end of a hydrocarbon chain ("arm") which is attached to the carrier; presumably when the ligand is attached close to the insoluble matrix the large enzyme cannot bind to it because of steric hindrance. The attachment of a ligand to the carrier usually involves modification of the ligand so that it will have a proper functional group which can be used for linking the ligand to the carrier. The ligand after modification should have a high affinity for the enzyme; preliminary specificity studies should be carried out to be certain that these alterations in structure involved in attaching the ligand do not substantially alter the affinity of the ligand for the enzyme. Adsorption of the enzyme to the insoluble ligand is usually carried out under conditions where the ligand-enzyme complex is known to be the most stable.

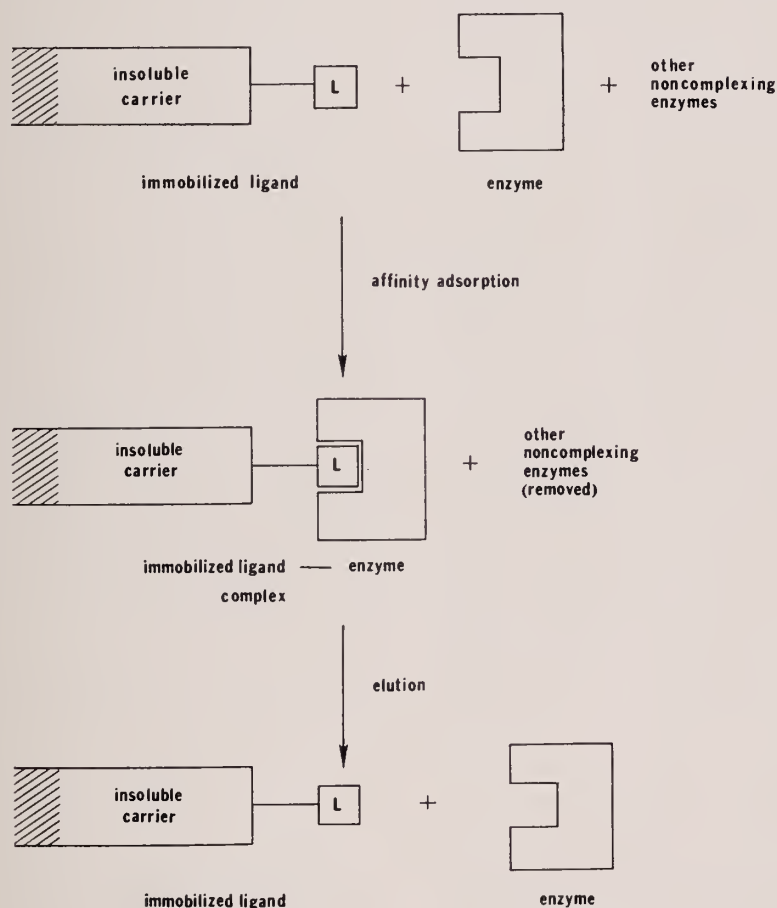


Fig. 3—General scheme illustrating the technique of affinity chromatography. Ligand (L) is attached to an insoluble carrier thus immobilizing the ligand. An enzyme or other biological molecule (hormone, antigen, antibody, or receptor protein, e.g.) having a specific binding site of high affinity for the ligand will bind to the immobilized ligand to form an immobilized ligand-enzyme complex. All other enzymes and other molecules not possessing a ligand-specific site are washed away leaving the one specific enzyme bound to the insoluble carrier. The bound enzyme is subsequently eluted from the carrier.

The enzyme is eluted (after washing away all unbound protein) by changing these conditions (pH, temperature, buffer, etc.) or in many cases by simply adding soluble ligand in high concentration to the eluting buffer which competes with and replaces the insoluble ligand.

Enzymes applied intravenously for therapeutic uses must usually be extremely pure to minimize undesirable immunological defense reactions and are, consequently, very expensive. An example of the successful application of affinity chromatography for the isolation of a therapeutic enzyme is the report that L-asparaginase can be isolated from extracts of *Escherichia coli* by chromatography on columns of ϵ -amino-caproyl-D-asparagine-agarose (ligand = D-asparagine; carrier = agarose; linking "arm" = ϵ -aminocaproic acid).¹² The enzyme was eluted from the column by addition of free D-asparagine and was obtained in higher purity and yield than the standard multi-stage procedure; in addition, the whole procedure was carried out in one step.

More recently Katz reported the isolation of human lysozyme by affinity chromatography on columns containing immobilized deaminated chitin from squid which has a very high affinity for lysozyme.¹³ The yields were in excess of 99% and the product, which was eluted from the column with acetic acid, was homogeneous and very active. Another advantage of the procedure is that the lysozyme can be isolated in just a few hours from a biological fluid such as human blood. The availability of reasonable quantities of human lysozyme offers the opportunity to explore many possible therapeutic applications for this enzyme. The enzyme splits the cell walls of bacteria causing lysis of the bacteria and has been shown to be effective as an antitumor agent, an antibacterial agent, and as a potentiator for many antibodies when it is administered as an antibiotic-lysozyme

complex. The use of human lysozyme therapeutically would minimize adverse immunological responses, although an immunological response which might result if lysozyme from another species was employed might not be a significant problem if immobilized lysozymes were used.

The general concept of affinity chromatography is not limited to the isolation of enzymes. In fact, it was first used, as indicated above, to isolate antibodies^{3,9} and with the increased use of radioimmunoassays the need for pure specific antibodies will increase and affinity chromatography will help meet this need. In this type of affinity chromatography the antigen (or hapten) is insolubilized by attachment to an appropriate support medium and the resulting immobilized antigen is used to purify the antibody as described above for enzymes. The procedure can be reversed and used to purify antigens; the antigen could be a hormone, enzyme, or other biological molecule. For example, rapid purification of human growth hormone might be accomplished in this way. Application to a problem of current research interest is the isolation and purification of "receptor proteins," whereby the effector molecule (such as a hormone) is immobilized and the bound "receptor proteins" eluted after washing away the unbound protein. Immobilized antigens have even been used to separate antibody-producing cells from other cells in this way.

The use of affinity chromatography is well established and will no doubt be applied to the isolation of even more enzymes in the future which were previously not available for exploitation as therapeutic or diagnostic agents. The field of immobilized enzymes is a new and very active area of research involving many disciplines and it can certainly be anticipated that new concepts of immobilization of enzymes and their applications to problems in medicine will be forthcoming.

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Procainamide Hydrochloride Sensitivity

Manifested by Fever and Chills

MENACHEM S. SHAPIRO, M.D.*; ALAN TEITLER, M.D.† and DAVID GROB, M.D.*

PROCAINAMIDE HYDROCHLORIDE (P-amino-N-2 diethylaminoethyl) benzamide hydrochloride (Pronestyl®), has been widely used as an antiarrhythmic and antiarrhythmic agent. Hypersensitivity reaction to the drug has been uncommon, manifested as either a febrile reaction, usually with chills and sometimes with dermatitis, occurring after one to 15 days of drug administration,¹⁻⁶ or as a "lupus-like" syndrome, usually with fever, occurring after three weeks to 22 months of drug administration. In this report, a patient is described who developed fever, shaking chills, and dermatitis after 14 days of procainamide administration.

Case Report

Onset of Clinical Myocardial Infarction

The patient was a 61-year-old white man admitted to the Maimonides Medical Center with pain in his chest and left arm on May 14, 1967.

On the morning of admission, the patient developed weakness, diaphoresis, nausea and precordial pain which radiated to the left arm. He had had an episode of left hemiparesis seven years previously and was then informed that he had hypertension. There was no history of diabetes mellitus or of drug or food allergy. Three members of his immediate family had a history of myocardial infarction.

Physical Findings

Physical examination revealed blood pressure of 120/80 mm Hg. The pulse was regular at 96 beats per minute with occasional premature beats. The temperature was 98.2°F (all temperatures rectal). The patient was afebrile. His skin was cool and moist and there was slight peripheral cyanosis. Inspiratory moist rales were heard in both lung bases. The heart sounds were distant, and no murmurs were heard. The liver edge was palpated beneath the right costal margin. There was no dependent edema. The right carotid artery pulsation was slightly decreased. The deep tendon reflexes were increased in

the left lower extremity.

The admission hemoglobin was 16.4 gm/100 cc; hematocrit, 48 percent; white blood count, 22,900/cu mm with 83 segmented neutrophils, seven band forms, and 10 lymphocytes. The urinalysis was normal. The blood urea nitrogen was 25 mg percent, the creatinine 0.8 mg percent, serum glutamic oxalic transaminase 129 units, serum glutamic pyruvic transaminase 30 units, and lactic dehydrogenase 2000 units.

The Evaluation of Sensitivity

The electrocardiogram showed an acute inferior wall myocardial infarction and frequent runs of ventricular tachycardia. The patient was treated initially with intravenous diphenylhydantoin, and after the administration of 500 mg the ventricular tachycardia reverted to normal sinus rhythm. Diphenylhydantoin was administered orally (100 mg four times a day), but was discontinued after eight days, following development of external ophthalmoplegia. Oral administration of procainamide hydrochloride, 500 mg every six hours, was started. The external ophthalmoplegia resolved six days after cessation of diphenylhydantoin. The myocardial infarction proceeded uneventfully until the 22nd day of hospitalization, 14 days after starting procainamide hydrochloride.

The patient then had a fever of 103°F, accompanied by shaking chills and malaise. The white blood cell count at this time was 6,900/cu mm with 62 segmented neutrophils, 17 band forms, eight lymphocytes, one monocyte and two eosinophils. The sputum culture revealed normal flora, and the blood and urine cultures were sterile. Although there was no clinical evidence of infection, cephalothin and colistin administration was begun.

On the next day the temperature rose to 105.5°F and a generalized maculopapular eruption appeared. The antibiotics were discontinued and lincomycin and kanamycin administration started. Remittent fever, with daily elevation to 104°F, continued for the next two days, accompanied by shaking chills and generalized malaise. The top of the spleen was palpated. The white blood count ranged from 7,000 to 9,000 at this time. On the fifth day of daily remittent temperature elevation, it was finally suspected that the fever, chills, and eruption might be due to procainamide hydrochloride and all medications were discontinued. Within 24 hours the temperature had dropped to 103°F and subsequently the patient continued to have a low-grade fever (100°F to 101°F) for six days after procainamide hydrochloride had been discontinued. This was attributed to the presence of an exfoliative dermatitis and furuncu-

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Dr. Shapiro is now with the Mier Hospital, Kfar-Saba, Israel.

†Posthumous.

TABLE 1A
Fever Occurring after One to 15 Days of Initial Procainamide Administration

Author (Ref. No.)	Daily Dosage (gm)	Duration of Adminis- tration Before Onset of Fever (days)	Total Dose Before Onset of Fever (gm)	Duration of Fever After Discontinua- tion of Procainamide (hours)
Liebowitz ¹	1.	7	7	
Bakos ²	1.5	11	16.5	< 24
Hellman ³	1.5	1½ (loading dose 1.5 gm)	2.25	
McGarry ⁴	3	1	3	< 24
Luton ⁵	1.5	No reaction after initial 30 day exposure; reaction within 24 hours of second exposure	24	< 24
Hey ⁶ patient 1	2	15	20	30
patient 2	1.25	15	18.75	18
patient 3	0.75	14	10.5	50
Present patient	2	14	28	36

losis which developed in the sites of the original cutaneous eruption. Eighteen days after the original febrile episode the patient was challenged with a single dose of 250 mg of procainamide hydrochloride. Within six hours his temperature rose to 104°F, and he had shaking chills and malaise but was afebrile within 36 hours. No skin rash occurred on this occasion. The white blood cell count was 7,000/cu mm. Blood and urine cultures were negative, and sputum culture revealed normal flora. Examination of the serum for lupus erythematosus factor and antinuclear globulin were negative. He continued to have an uneventful convalescence and was discharged on the 54th hospital day.

Comments

Patients who have developed fever due to procainamide administration have been in two general groups: those who develop fever, usually with chills and sometimes with dermatitis, after one to fifteen days of drug administration, and those who develop a lupus-like syndrome, usually with fever, after three weeks to twenty-two months of drug administration.

In eight reported patients¹⁻⁶ fever began within 15 days after oral administration of less than 24 grams of the drug (Table 1A). The temperature elevations ranged between 101° and 106.2°F with daily elevations of a remittent nature as long as the drug was continued. The cause of the fever was not immediately recognized; however, the fever disappeared within 50 hours after discontinuation of the drug.

When procainamide was re-administered to a patient who had previously had fever due to this drug, fever appeared in less than 24 hours and lasted no more than 24 hours¹⁻⁶ (Table 1B). The maximum elevation of temperature was similar to that which occurred during the initial drug

administration. In the patient described in this report, readministration of 0.25 grams of procainamide orally was followed within six hours by the reappearance of fever which lasted approximately 16 hours.

TABLE 1B
Fever Occurring on Readministration of Procainamide after Subsidence of Initial Drug Fever

Author (Ref. No.)	Challenging Dose (gm)	Time between Challenging Dose and Onset of Fever (hours)	Maximum Temperature Elevation (F)	Duration of Fever after Discontinua- tion of Pro- cainamide (hours)
Liebowitz ¹		< 24	104.0	< 24
Bakos ²	0.75	< 13	104.0	< 12
Hellman ³	1.0	< 24	102.0	
McGarry ⁴	0.5	< 24	105.0	< 8
Luton ⁵	0.5	< 12	101.0	< 8
Hey ⁶				
patient 1	0.5	< 6	104.6	16
patient 2	0.5	7	102.4	18
patient 3	0.25	7	105.2	8
Present case	0.25	< 6	104.0	< 16

Shaking chills, malaise, dermatitis, anorexia, nausea, arthralgia, headache, nasal congestion, diaphoresis, diuresis, vomiting and paresthesia have been observed. Splenomegaly, adenopathy, and peripheral vasoconstriction have been found on physical examination (Table 1C). The relation of the dermatitis to procainamide administration is not certain since the patient was also receiving Cephalothin and Colistin. When our patient was later challenged with a single dose of procainamide, fever, shaking chills and malaise recurred, but the dermatitis did not reappear.

Except for the appearance of eosinophilia and cold agglutinins in one patient each, no significant laboratory findings have been noted during or after the development of drug fever (Table 1D).

Likewise there have been no reports of lupus erythematosus or of anti-nuclear antibody in the reported instances of procainamide administration in which fever developed or in the patient who was studied in this report.

Patients who have developed evidence of hypersensitivity to procainamide after longer periods of drug administration have usually had one or more manifestations of a lupus-like syndrome; the commonest sign or symptom has been arthritis. Other signs and symptoms have included pleurisy, fever, pneumonitis, weakness, hepatomegaly, myalgia, skin lesions, pericarditis, splenomegaly, lymphadenopathy, central nervous system manifestations, gangrenous digits and ulcerated tonsils (Table

TABLE 1C
Maximal Temperature Elevation, Symptoms and Signs Occurring after One to 15 Days of Initial Procainamide Administration

a't. No.	(Ref. No.)	Maximal Temp. Elevation (F)	Symptoms	Signs
1	Liebowitz ¹	104.0	Shaking chills, weakness, sweating	
2	Bakos ²	104.0	Chills, nausea; vomiting, mental depression	Maculopapular itching rash
3	Hellman ³	102.0	Nasal congestion	Slight generalized adenopathy, maculopapular erythematous, itching rash.
4	McGarry ⁴	105.0	Shaking chills, malaise, arthralgias, headache, anorexia	
5	Luton ⁵	not recorded	Chills, generalized nervousness, malaise, nausea, tingling	Diuresis, pale, moist
6	Hey ⁶ patient 1	104.0	Malaise, anorexia, shaking chills	
7	patient 2	105.2	Malaise, anorexia, shaking chills	
8	patient 3	106.2	Malaise, anorexia, shaking chills	Tip of spleen
9	Present patient	105.5	Malaise, shaking chills	Tip of spleen, maculopapular rash

TABLE 1D
Laboratory Studies in Patients who Developed Fever after One to 15 Days of Procainamide Administration

Author (Ref. No.)	White blood count	Eosinophils %	Miscellaneous
Bakos ²	5,000		
Hellman ³		7	
Hey ⁶ patient 1	6,300	2	Cold agglutinins positive.
patient 2	7,400	2	LE preparation negative. Direct coombs' negative.
patient 3	5,100	0	Coombs' negative.
Present case	6,900	1	LE preparation negative. Antinuclear antibodies negative.

2A). Laboratory findings include antinuclear antibodies, the lupus erythematosus factor, anemia, a positive latex fixation test, leukopenia eosinophils, hypergammaglobulinemia, thrombocytopenia. Coomb's positive test, and proteinuria (Table 2B). The signs and symptoms of the lupus-like syndrome have subsided after discontinuation of procainamide, but serologic changes have persisted for longer periods, even as long as two years.¹⁰ The administration of adrenal cortical steroid has been reported to produce prompt defervescence and subsidence of symptoms, with or without^{10,12,13,15,16} continued administration of procainamide.

The nine patients (eight reported and one described) who developed fever after one to 15 days of procainamide administration had none of the serologic manifestations of the lupus-like syndrome, while the 36 who developed the syndrome

TABLE 2A
Signs and Symptoms in 36 Patients with Procainamide Induced Lupus-Like Syndrome

Arthralgia-Arthritis	30
Pleuropulmonary	18
Pleurisy	18
Pneumonitis	9
Fever	16
Weakness	11
Myalgia	9
Anorexia	7
None	4
Central nervous system	2
Confusion	1
Depression	1
Night sweats	1
Parasthesias	1
Hepatomegaly	10
Skin lesions	7
Pericarditis	5
Splenomegaly	5
Lymphadenopathy	5
Cyanotic gangrenous digits	1
Ulcerated tonsils	1

TABLE 2B
Laboratory Studies in 36 Patients with Procainamide Induced Lupus-Like Syndrome

	Number of Patients Studied	Number Abnormal
Antinuclear antibodies	23	22
Positive LE cell test	36	31
Elevated erythrocyte sedimentation rate	24	16
Anemia	33	12
Positive latex fixation test	21	8
Leukopenia	33	8
Eosinophilia (3%)	33	7
Hypergammaglobulinemia	24	7
Thrombocytopenia	12	2
Coombs' positive test	18	2
Proteinuria	35	1

after three weeks to 22 months had one or more serologic manifestations of the syndrome. The duration of drug administration appears to be important in the development of the syndrome. The development of fever after one to 15 days of procainamide administration may be due to a hypersensitivity reaction that represents an early stage of the lupus-like syndrome. The rate at which other manifestations of the syndrome develop with continued administration of the drug will probably be found to vary with constitutional factors, including immunologic responsiveness.²¹ The importance of recognition of the febrile and lupus-like reactions to procainamide, and of prompt discontinuation of the drug, is obvious.

The patient who was described developed an unusual reaction to diphenylhydantoin, manifested by external ophthalmoplegia, a reaction not mentioned in several reviews of the effects of this drug.²²⁻²⁴ Although the patient was not challenged with diphenylhydantoin, it seems likely that the drug was responsible for the changes in extraocular movement that were observed.

Generic and Trade Names of Drugs

Procainamide hydrochloride (Pronestyl)
Sodium cephalothin (Keflin)
Colistin sulfate (Coly-Mycin)
Kanamycin sulfate (Kantrex)
Lincomycin hydrochloride monohydrate (Lincocin)
Diphenylhydantoin (Dilantin)

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Humanism at the Bedside

ARNOLD LIEBERMAN, M.D.*

BEING PARTIAL TO ourselves, we humans use this word as the antonym of Animal. Humanism evokes such synonyms as, sympathetic, clement, compassionate, touched to the heart—the list is long. These desirable terms are in contrast to mechanistic, unthinking, callously oppressive—words lumped together as animalistic or *inhuman*: in short, brutish. Why is a discussion of “Humanism at the Bedside” acquiring increasing relevance to the physician of today?? Is it, perhaps, because the public image of the doctor continues to shrink? In inverse proportion to his enormously expanding knowledge and skill, people at large hold him in ever shriveling esteem. No longer a beloved member of the families seeking his ministrations, we appear to be sinking to a level with such hired hands as truck drivers, plumbers and what have you.

In 1891, Sir Luke Fildes depicted a most memorable tableau. In the predawn darkness, a child is lying on two chairs pulled together; the parents are hovering in the back-ground. In the very center of the picture, the family physician is sitting, chin propped by the hand even as his elbow rests on his knee. The little black bag is lying on the floor: *so* pathetically useless: The crisis—the issue of life and death—is up to God; But the doctor—the intensely involved member of the family—is at one with the parents awaiting the answer from on High.

In 1938, Dr. A. Hertzler wrote the best seller, “Horse and Buggy Doctor”. This volume caressingly conjures the Kansas pioneer making his rounds at the turn of the century. What did he carry in his buggy besides digitalis, ether—some dressings, splints and antiseptics: maybe, even a Simpson forceps. Ah, yes: In abundant measure he had intense identification with all sod-busters of his horizon scanning lonely prairies: He was totally devoted to the solitary farmers. Despite distance, fatigue, road hazards—when called, he came forthwith: Within the limits of his compassion and ability, he gave his all. Remuneration? Those farmers gave what they could . . .

In the second decade of just this century, the

famous Flexner reports spelled out the short comings of American Medicine. The *what* and the *how* of the reforms needed to put the U.S.A. into the 20th century were spelled out. The doctors of today are the beneficiaries of the better teaching (and the knowledge explosion) that followed the end of WWI and is still accelerating at a logarithmic pace. 90% of today's most useful drugs and techniques were unknown as late as 1950: So many previously doomed millions are being saved that we are experiencing a veritable Population Explosion with all its attending problems: but that is another issue.

With expanding professional knowledge and expertise, there arises increasing specialization in ever narrowing sub-specialties. Now we see our problem; who is rendering the *primary* care?? With whom does the patient and his family identify in the first place? Let us affirm that the graduates of today are as dedicated to their profession as were their elders of yesteryear. But: how can the orthopod of today, restricting himself to surgery of the hand alone and getting all his surgery only by referral, become the family physician? The very eminent cardiac surgeon performing coronary cineradiography only—can the patient regard him as anything more than a very skillful technician?

It is obvious that multi-staffed, superbly equipped clinics and multi-purposed ambulatories and home care units are the wave of imminent tomorrow. But: after all is said and done, we are still faced with the ineluctable fact that 2/3 of all patients require only sympathy and understanding. Which doctor will become the Father Confessor of yesteryear? Modern hospitals are acquiring Intensive Care Units with all the paralleling complexes. Computers can feed “bits” of knowledge to the M.D. or R.N. sitting at the nurses' station—or in a center a continent away. Regular para-medical technicians can service the patient and alter therapy at phoned or wired command; we are enthralled by “hardware” and “software”. The computer commanders are adding a new termin to their jargon; are you familiar with ‘liveware’? Human intelligence, no

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less . . .

It is clear that we see an increasing priesthood serving the Moloch of the machine. We have a growing hierarchy of prestige seeking bureaucrats. But: who will be rendering the primary care? Who will amalgamate with the patient and his

family? This Holy Grail will be found: hopefully sooner than later. We just must have absolute Faith that the answers will be forthcoming within the coming decade: Let our best minds dedicate themselves to this inspiring goal. A general consensus will allow its implementation within the decade.

Historic Hospital The Pennsylvania Hospital, Philadelphia



The Pennsylvania Hospital as it appeared in 1814. Courtesy National Library of Medicine, Bethesda, Maryland.

The oldest hospital in the United States is the Pennsylvania Hospital at Philadelphia. The East Wing, shown on the right in the engraving, was completed in 1756; the inscription for its cornerstone was composed by Benjamin Franklin, who was president of the hospital's Board of Managers from 1755 to 1757.

In the 1750's Philadelphia was a commercial seaport and agricultural market of some 15,000 inhabitants. Townspeople complained that the hospital was being built too far from what was then the center of town; although the complaint seems groundless now. There being no professional architect in the colonies, the design and construction of the hospital were entrusted to one of the members of the Board of Managers, Mr. Samuel Rhoads, a Philadelphia builder. The soundness of his work is attested by the fact that the building is still in use as a hospital.

By 1763 the hospital census was constantly upwards of one hundred patients. Male patients were assigned to the first floor, females to the second, and mental patients were confined in locked facilities in the basement. In the early years curious townsfolk would gather about the ground floor windows observing or even teasing the "lunaticks." A fence was built around the windows, and, until more humane measures were adopted in 1791, the curious were charged an admission fee to watch the antics of the insane.

The West Wing was completed in 1796 and the Central Building in 1804. The third floor of the Central Building was covered by a skylight and equipped with concentric rows of elevated benches to serve as a clinical and surgical amphitheater. This feature was much admired by Charles Bullfinch, the architect of the Massachusetts General Hospital, who incorporated into his design a similar structure which became famous as the "Ether Dome."

Warren Kump, M.D.
North Memorial Hospital

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Usage in Pregnancy: In pregnancy, nursing mothers and women who might bear children, weigh potential benefits against hazards. Inhibition of lactation may occur.

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Adverse Reactions: Drowsiness, excessive dryness of nose, throat or mouth; nervousness; or insomnia. Also, nausea, vomiting, epigastric distress, diarrhea, rash, dizziness, weakness, chest tightness, angina pain, abdominal pain, irritability, palpitation, headache, incoordination, tremor, dysuria, difficulty in urination, thrombocytopenia, leukopenia, convulsions, hypertension, hypotension, anorexia, constipation, visual disturbances, iodine toxicity (acne, parotitis).

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Note: Oral contraceptives are complex medications. As with all medications they should
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For brief summary of prescribing information, please see next page.

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Actions—Ovulen and Demulen act to prevent ovulation by inhibiting the output of gonadotropins from the pituitary gland. Ovulen and Demulen depress the output of both the follicle-stimulating hormone (FSH) and the luteinizing hormone (LH).

Special note—Oral contraceptives have been marketed in the United States since 1960. Reported pregnancy rates vary from product to product. The effectiveness of the sequential products appears to be somewhat lower than that of the combination products. Both types provide almost completely effective contraception.

An increased risk of thromboembolic disease associated with the use of hormonal contraceptives has now been shown in studies conducted in both Great Britain and the United States. Other risks, such as those of elevated blood pressure, liver disease and reduced tolerance to carbohydrates, have not been quantitated with precision.

Long-term administration of both natural and synthetic estrogens in subprimate animal species in multiples of the human dose increases the frequency of some animal carcinomas. These data cannot be transposed directly to man. The possible carcinogenicity due to the estrogens can be neither affirmed nor refuted at this time. Close clinical surveillance of all women taking oral contraceptives must be continued.

Indication—Ovulen and Demulen are indicated for oral contraception.

Contraindications—Patients with thrombophlebitis, thromboembolic disorders, cerebral apoplexy or a past history of these conditions, markedly impaired liver function, known or suspected carcinoma of the breast, known or suspected estrogen-dependent neoplasia and undiagnosed abnormal genital bleeding.

Warnings—The physician should be alert to the earliest manifestations of thrombotic disorders (thrombophlebitis, cerebrovascular disorders, pulmonary embolism and retinal thrombosis). Should any of these occur or be suspected the drug should be discontinued immediately.

Retrospective studies of morbidity and mortality conducted in Great Britain and studies of morbidity in the United States have shown a statistically significant association between thrombophlebitis, pulmonary embolism, and cerebral thrombosis and embolism and the use of oral contraceptives. There have been three principal studies in Britain¹⁻³ leading to this conclusion, and one in the United States. The estimate of the relative risk of thromboembolism in the study by Vessey and Doll³ was about sevenfold, while Sartwell and associates⁴ in the United States found a relative risk of 4.4, meaning that the users are several times as likely to undergo thromboembolic disease without evident cause as non-users. The American study also indicated that the risk did not persist after discontinuation of administration and that it was not enhanced by long-continued administration. The American study was not designed to evaluate a difference between products. However, the study suggested that there might be an increased risk of thromboembolic disease in users of sequential products. This risk cannot be quantitated, and further studies to confirm this finding are desirable.

Discontinue medication pending examination if there is sudden partial or complete loss of vision, or if there is a sudden onset of proptosis, diplopia or migraine. If examination reveals papilledema or retinal vascular lesions medication should be withdrawn.

Since the safety of Ovulen and Demulen in pregnancy has not been demonstrated, it is recommended that for any patient who has missed two consecutive periods pregnancy should be ruled out before continuing the contraceptive regimen. If the patient has not adhered to the prescribed schedule the possibility of pregnancy should be considered at the time of the first missed period.

A small fraction of the hormonal agents in oral contraceptives has been identified in the milk of mothers receiving these drugs. The long-range effect to the nursing infant cannot be determined at this time.

Precautions—The pretreatment and periodic physical examinations should include special reference to the breasts and pelvic organs, including a Papanicolaou smear since estrogens have been known to produce tumors, some of them malignant, in five species of subprimate animals. Endocrine and possibly liver function tests may be affected by treatment with Ovulen or Demulen. Therefore, if such tests are abnormal in a patient taking Ovulen or Demulen, it is recommended that they be repeated after the drug has been withdrawn for two months. Under the influence of progestogen-estrogen preparations preexisting uterine fibromyomas may increase in size. Because these agents may cause some degree of

fluid retention, conditions which might be influenced by this, such as epilepsy, migraine, asthma, cardiac or renal dysfunction, require careful observation. In breakthrough bleeding, and in cases of irregular bleeding per vaginam, nonfunctional causes should be borne in mind. In undiagnosed bleeding per vaginam adequate diagnostic measures are indicated. Patients with a history of psychic depression should be carefully observed and drug discontinued if the depression recurs to a serious degree. The possible influence of prolonged Ovulen or Demulen therapy on the pituitary, ovarian, adrenal, hepatic or uterine function awaits further study. A decrease in glucose tolerance has been observed in a significant percentage of patients on oral contraceptives. The mechanism of this decrease is obscure. For this reason, diabetic patients should be carefully observed while receiving Ovulen or Demulen therapy. The age of the patient constitutes no absolute limitation, although treatment with Ovulen or Demulen may mask the onset of the climacteric. The pathologist should be advised of Ovulen or Demulen therapy when relevant specimens are submitted. Susceptible women may experience an increase in blood sugar following administration of contraceptive steroids.

Adverse reactions observed in patients receiving oral contraceptives—A statistically significant association has been demonstrated between use of oral contraceptives and the following serious adverse reactions: thrombophlebitis, pulmonary embolism and cerebral thrombosis.

Although available evidence is suggestive of an association of a relationship has been neither confirmed nor refuted for the following serious adverse reactions: neuro-ocular lesions, e.g., retinal thrombosis and optic neuritis.

The following adverse reactions are known to occur in patients receiving oral contraceptives: nausea, vomiting, gastrointestinal symptoms (such as abdominal cramps and bloating), breakthrough bleeding, spotting, change in menstrual flow, amenorrhea or bleeding after treatment, edema, chloasma or melasma, breast changes (tenderness, enlargement and secretion), change in weight (increase or decrease), changes in cervical erosion and cervical mucus, suppression of lactation when given immediately postpartum, cholestatic jaundice, migraine, rash (allergic), rise in blood pressure in susceptible individuals and mental depression.

Although the following adverse reactions have been reported in users of oral contraceptives, an association has been neither confirmed nor refuted: anovulation post treatment, premenstrual syndrome, changes in libido, changes in appetite, cystitis-like syndrome, headache, nervousness, dizziness, fatigue, backache, pruritus, loss of scalp hair, erythema multiforme, erythema nodosum, hemorrhagic eruption and itching.

The following laboratory results may be altered by the use of oral contraceptives: hepatic function: increased sulfobromophthalate retention and other tests; coagulation tests: increase in prothrombin Factors VII, VIII, IX and X; thyroid function: increase in plasma butanol extractable protein bound iodine, and decrease in iodine take values; metyrapone test and pregnanediol determination.

References: 1. Royal College of General Practitioners: Oral Contraception and Thrombo-Embolic Disease, J. Coll. Gen. Pract. 13:267-279 (May) 1967. 2. Inman, W. H. W., and Vessey, M.: Investigation of Deaths from Pulmonary, Coronary, and Cerebral Thrombosis and Embolism in Women of Child-Bearing Age, Med. J. 2:193-199 (April 27) 1968. 3. Vessey, M. P., and Doll, R.: Investigation of Relation Between Use of Oral Contraceptive and Thromboembolic Disease. A Further Report, Brit. Med. J. 2:683 (June 14) 1969. 4. Sartwell, P. E.; Masi, A. T.; Arthes, F. G.; Gell, G. R., and Smith, H. E.: Thromboembolism and Oral Contraceptives: An Epidemiologic Case-Control Study, Amer. J. Epidemiol. 90:365-380 (Nov.) 1969.

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Indication—Enovid-E is indicated for oral contraception. The **Special Note, Contraindications, Warnings, Precautions** and **Adverse Reactions** listed above for Ovulen and Demulen are applicable to Enovid-E and should be observed when prescribing Enovid-E.

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Where "The Pill" Began

be and the more frustrating it will prove to the individual student or physician. Optimal resolution, then, might well be sought at the doors of admission to the medical school.

Would it be unreasonable to expect the student at the time he seeks admission to medical school to select a specific professional career within the field of medicine? Should he be required to declare whether he intends to become a surgeon, a psychiatrist, or otherwise? At comparable age and academic status, candidates for the Ph.D. degree must make a similarly specific choice. Admission to university graduate schools commonly is by way of a specific department and discipline. Is a career in chemistry remarkably more distinct from a career in English language and literature than is a career in surgery from a career in psychiatry? Admittedly, though, the usual recipient of a bachelor's degree believes he has basis in his collegiate studies to judge whether his talents and competences fit him for graduate courses in chemistry, on the one hand, or, on the other, for similarly advanced courses in a field as remote from chemistry as is English. He may rightly judge his college courses provided scant basis for a career choice between surgery and psychiatry. This deficiency could be removed, though, by appropriately designed experiences at the pre-baccalaureate degree level.

Suppose this deficit in the student's knowledge of medical careers could be remedied and he might reasonably be asked to seek admission to a specific department in the medical school. Such an admissions policy would offer certain advantages, among which are the following:

1. An opportunity would be provided to departmental leadership in specialties notably in short supply of professional personnel to recruit from the total pool of individuals who wish to become physicians. Some 50% of qualified individuals in this pool will, under existing circumstances, not be admitted to medical school.

2. Professional responsibilities and skills differ widely from one medical or surgical specialty to another. Certain individuals highly qualified for one specialty but not as well rounded as the usually successful candidate may be found among the 50% or more of candidates currently rejected by the medical schools. Faculty members in a given discipline should be uniquely capable of recognizing individuals highly talented for discharge of responsibilities of their specialty. Humanistic

qualities and talents in the student might thereby achieve influence competitive with that possessed currently by results of examinations that reflect more readily quantifiable components of intelligence and human behavior.

3. A departmental head might identify within the ranks of his allied health training programs an occasional student of exceptional talent, motivation, and accomplishments; such an individual could be assured medical school admission to the chairman's department on completion of studies crucial to his "premedical" education.

4. Members of the faculty of a given department would have opportunity to guide the educational experiences of a small group of students to whom they could relate intimately throughout undergraduate and graduate medical educational years. In such context, the medical student would be assured exposure to the highly personalized faculty-resident relationship that prevails in residency programs generally in the United States.

5. Financial support of the program might be attracted from sources desirous of encouraging recruitment to specialties currently deficient in manpower.

However, a number of major adaptive responses would be needed, both at the premedical and medical school level, before such a program of departmental admissions could become operable. In Mayo Medical School, we are probably five to 10 years removed from overt experimentation with such an undertaking, though we are including elements of the concept in our present admissions procedures.

Meanwhile, the move toward earlier differentiation of medical students into disciplinary career interests is occurring in the form of medical school "tracks," that is, clinical or laboratory "majors." The Figure displays the tracks that have been proposed for Mayo Medical School. Within the first two years of our curriculum, we have attempted to compress an overview of medical science and medical practice comparable to that achieved in the full four years of medical school by the students of earlier decades. By the time the students complete the second year clerkship, we anticipate many of them will have gained insights sufficient to permit them, in counsel with faculty, to design an integrated pre- and post-M.D. training program in a medical, surgical, or laboratory discipline.

Incorporated in the final two pre-M.D. years

will be a six to 15 month experience in a laboratory of clinical or basic science, or in some other form of scholarly endeavor particularly appropriate to the students' career goals. Such an experience was once component to the residency training in Mayo Graduate School. The increasing demands of specialty board examinations and the high cost of supporting residents' stipends have led to a near elimination of this experience from many of our post-M.D. specialty training programs. We believe this loss should not go unremedied and we think incorporation of a comparable experience in the pre-M.D. component of the integrated undergraduate and graduate medical educational program will effect such restitution.

If the student and his faculty adviser discover in due course that they have erred in selection of the student's career, then transfer to a more appropriate program will be accomplished. If this transfer occurs in the pre-M.D. period, then probably little will be lost in comparison with what would have been gained under more traditional curricular processes. If the student and his counselor have made a correct choice, then the student will have the advantage of early concentration of his talents and energies on goals especially appropriate to his own career.

The processes just described may indeed increase the efficiency and relevance of the formal years of medical education. If, though, the student has been admitted to medical school without commitment to a specialty and if he is given free choice among the several medical, surgical, and laboratory disciplines throughout the four years of medical school, then what reason have we to expect that the optimal number of students will end up pursuing careers in primary medical care, "Generalists," as the label reads at the bottom of the diagram in the Figure, and the proper number in more narrowly delimited disciplines labeled "Specialists"? Such optimal distribution has not been produced by permitting free choice to students of the past several decades.

In recent years, to be sure, certain faults in the academic process that contributed to the medical students' near universal selection of a specialty career have been partially remedied. These students increasingly are exposed to the role of the primary physician; family practice has been accorded status as a specialty and its representatives brought on to the medical school faculty; efforts are being made to improve the quality of

professional life of the primary physician. All this is helpful and desirable. I can but wonder if it is enough.

If we believe that resolution of faulty distribution of physicians among the several specialties will require measures of greater and more immediate consequence than those currently applied, we might well consider their initiation at the juncture between the pre- and post-M.D. training of the physicians. But a change in the market place for residency training must be effected if maldistribution of physicians among the specialties is to be corrected by intervention at this juncture between pre- and post-M.D. training. The number of openings in residency programs in the United States today is sufficiency great in relation to the number of graduates from United States medical schools that each graduate almost certainly can secure an appointment in whatever specialty discipline he elects. Hence, if the correct numbers of specialists in several disciplines are to be derived through the process of post-M.D. training, it will be necessary to define precisely how many residency positions in each discipline are available in the United States. This could be effected by collaboration between the residency accrediting agencies and the sources of funding for those residencies.

Such collaboration is indeed in process and is manifested in the preferential funding of family practice residencies by federal and state authorities. Only one step separates preferential funding of certain programs from limitation in funding of others. Quotas of residency positions by specialty on a national basis may be a development but a few years removed. As a consequence of such regimentation of opportunities for specialty training, certain physicians with a newly acquired M.D. will confront a limitation on their career choices. However, in a well-run system such as the intern matching plan, such limitation would be the product of the physician's failure in a fair and open competition for one of limited numbers of residency slots in certain specialties. He would still have open to him a medical career in one or several other disciplines, all of them providing a worthy challenge to his talents and rich opportunity for a life of well-rewarded service. The winds of chance may in fact blow him into a career for which he is better suited than the one to which his own judgment would have consigned him! If this process is deemed coercive, I can

only surmise it is likely to be less so than the alternative processes devised by a society frustrated by our profession's inadequate efforts to resolve the problem of maldistribution of physicians by specialty.

The Figure addresses major problems in physician manpower production. Our comments on the chart have revealed that any change in what has been the traditional process of career choice and specialty training among medical students and residents will entail a set of new compromises, some of them painful. Almost certainly, the stu-

dent will be encouraged to make a decision on his choice of career earlier in the course of his medical education and he may be forced to accept direction with respect to that choice by forces he would prefer to avoid. We shall do well, though, as responsible members of the profession, to study the factors involved in career choices and seek thereafter so to mold the admissions' processes and the student's choice of a career that the best interests of all concerned will be well served.

Raymond D. Pruitt, M.D.
Mayo Clinic and Mayo Foundation
Rochester, Minnesota

Meconium Aspiration in the Newborn

THE PROBLEM of meconium aspiration is put into perspective by Strickland and Edwards in their article.* Although there are a group of patients that do well with little or no treatment, the patient with respiratory distress associated with meconium aspiration can be one of the most difficult problems in pulmonary medicine. Unlike the infant with other types of respiratory distress which generally has an acute onset and then stabilizes, the child with meconium aspiration can become steadily and relentlessly worse over a period of days. They are very likely to develop a pneumothorax secondary to the ball valve effect of the meconium in the bronchioles.

The thesis that the problem in meconium aspiration is to a large extent secondary to the inspissated material in the trachea and main stem bronchi, is attractive. Dr. Strickland's observation

of the high number of infants with meconium in the trachea would tend to support this. This concept would make it imperative that as much of the material as possible be removed.

The problem which does not seem to be well dealt with in the article is that of the hypoxia which was the initiating cause of the passage of meconium into the amniotic fluid. Should a person delay vital oxygen therapy long enough to do a tracheal lavage? In the previous study, Dr. Strickland demonstrated that lavage lowers the P_{aO_2} .¹

I feel that adequate suctioning is indicated. I do not know whether the efficacy of lavage with concomitant delay in oxygen therapy and its tendency to lower P_{aO_2} has been well proven.

David B. Klain, M.D.
Children's Health Center
Minneapolis, Minnesota

*See page 1031.

Reference

1. Strickland, MB, Tracheobronchial lavage in small infants, Minnesota Medicine 56:287, 1973.

Holmes was turning the pipe about in his hand, and staring at it in his peculiar pensive way. He held it up and tapped on it with his long, thin forefinger as a professor might who was lecturing on a bone.*

Arthur Conan Doyle: The Yellow Race. Memoirs of Sherlock Holmes, 1893.

Snowmobiling Associated with Maxillofacial Injuries

SNOWMOBILES AND motorcycles connote fun, excitement, and sometimes a means of transportation. It also means with alarming frequency the reality of sprains, lacerations, fractures, concussions, and even death. I shudder to think that one out of every 25 Minnesotan snowmobilers may get injuries, varying from a sprain to a fatality.* There was an increase of two and a half times in mortality (33 persons) in the last fifteen months of the study compared to 13 deaths during the same period, in 1969 to 1970. The injuries involve the maxillofacial areas in 26% and the upper and lower extremities in 61%, resulting in prolonged morbidity and serious residual disability. Dr. Karleen strongly points out the way to minimize the problem through prevention, better rules and regulations, and strict

adherence to them. Just as important is the recognition by the manufacturers of the problems so the vehicle can be made with better safety devices. However safe the vehicle is, the ultimate responsibility still remains with the driver. As physicians, we have to face the facts that snowmobiles and motorcycles are here to stay and therefore injuries are going to occur. The Emergency Room facilities and medical personnel in the rural towns should be upgraded to handle such emergencies, and better transportation must be available to transfer these patients to larger centers. Many times the victim has multiple injuries and would therefore require a sophisticated Emergency Room facility as well as multiple specialty medical services.

Ramon B. Gustilo, M.D.
Head, Department of Orthopaedics
Hennepin County General Hospital

*Karleen, Conrad L.: Snowmobiling with Associated Maxillofacial Injuries. Minnesota Med 56:975, 1973.

Alcohol and Chemical Dependency

ALCOHOL AND RELATED chemical dependencies are among the most under diagnosed illnesses of our time. There are an estimated six to nine million alcoholics in the United States, and about 80% of general hospital admissions are associated with the disease of alcoholism. Yet formal courses in this subject are offered in only a very few medical schools. Therefore, recent efforts of the University to initiate study in this area are to be encouraged.

It may be a long wait before the arrival of promised federal funds; hopefully, our state legislature and the medical school will recognize

the extreme need for our physicians to acquire much needed knowledge in this field and take action immediately. We have begun, but much more is required; a few lectures and seminars are not adequate preparation for our physicians. While physicians cannot be considered the ultimate treatment resource for everyone who suffers from alcohol or chemical dependency, we must be able to diagnose these conditions if satisfactory referrals are to be made.

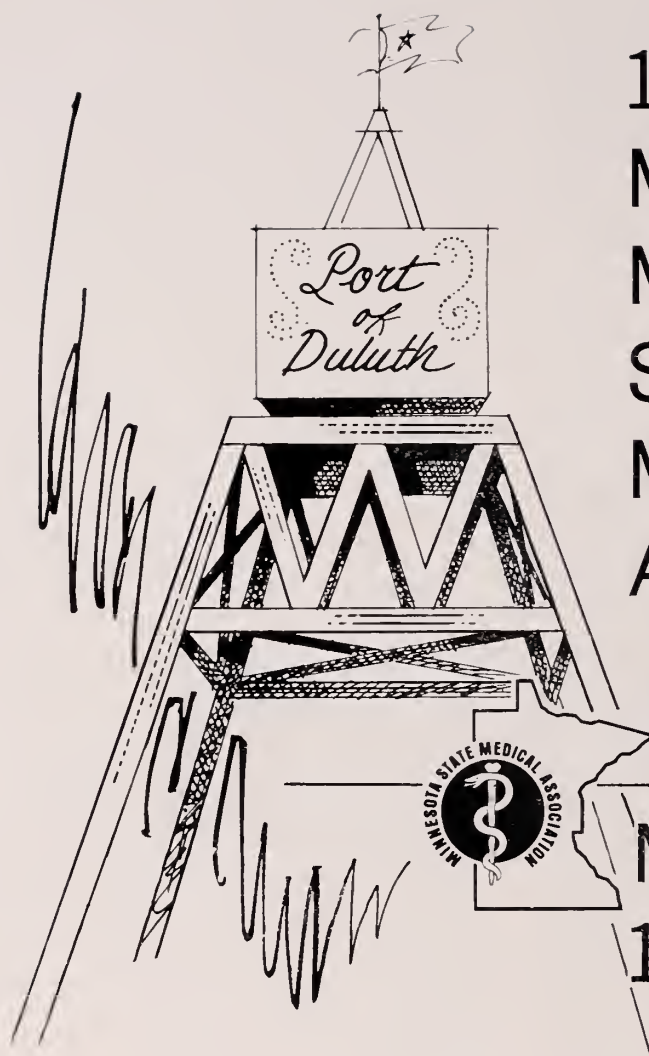
James Janacek, M.D.
St. Paul, Minnesota

Ophthalmia Neonatorum

AS A RESULT of changing morals, a dramatic rise in the incidence of venereal disease has occurred. Boone et al.* have, therefore, chosen a timely subject for inclusion in a general medical journal such as MINNESOTA MEDICINE. Although gonorrheal ophthalmia is still an infrequent disease, it is

probably on the increase and since prompt treatment is necessary to prevent possible visual damage which may occur, a high index of suspicion of any purulent conjunctivitis in the newborn or adults must be present. In prying open lids which are swollen shut, the doctor must be careful that pus under pressure does not squirt him in the eye! Although by no means diagnostic, as other

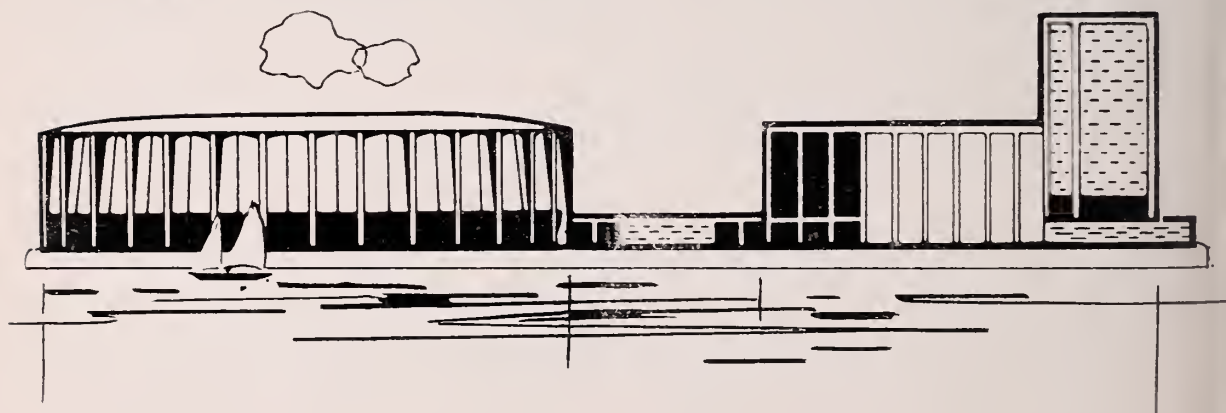
*Boone WB et al.: Ophthalmia neonatorum. The value of prophylactic treatment. Minnesota Med 56:940, 1973.



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eye infections of the newborn may also give a purulent discharge, a thick creamy pus is characteristic of gonorrheal ophthalmia. Pronounced conjunctival and lid edema usually are also present.

The authors have concisely covered all aspects of the prophylactic controversy. It has been present a long time and undoubtedly will be with us in the future. Because of the danger of resistance to antibiotics developing, I agree with the authors that 1% Silver Nitrate is probably

the prophylaxis of choice. Prophylaxis with either 1% Silver Nitrate or Penicillin has been shown to reduce the incidence of gonorrheal ophthalmia and thus to abandon all prophylaxis as some have advocated would seem particularly unwise in the presence of an increasing incidence of gonorrhea. We must not feel that prophylaxis in the newborn is 100% effective in preventing the disease for no single dose of any kind will prevent all the cases.

John P. Wendland, M.D.
Minneapolis, Minnesota

Letters to the Editor

Dear Editor:

Physicians are often asked to give statements with respect to a patient's ability to work. These statements are required of patients who apply for Aid to Disabled, Social Security disability, aid from Department of Veteran's Affairs, Workman's Compensation, and General Assistance.

Many times the physician is unrealistic when making his evaluation and appears unaware of job requirements in today's market. Recently a fifty-nine year old woman with a second grade education was told that she could work at a job where she "sat down." She is suffering from severe arthritis and hypertension and has done only hard physical work since early childhood. There is no sedentary occupation for which she qualifies, nor can she pass a physical examination. Her doctor's statement is now preventing eligibility for the new Federal Supplementary Security Income Program which starts January 1, 1974.

Let us ask the medical profession to use judgment and common sense in carrying out its responsibility in this area.

Leonore Y. Kaplan
Social Worker
Department of Public Relief
Minneapolis, Minnesota

Dear Editor:

A series of five one-a-month television programs is to be presented on Public Broadcasting stations across the country every Fourth Monday evening. Subjects of the series are: *Heart Disease* (November 19); *Inborn Genetic Defects* (December 17); *Pulmonary Disease* (January 14); *Trauma* (February 11); and *Cancer* (March 11).

We would like your help in telling your readers about the series, and in encouraging them to work with their local PBS stations and health organizations on community out-reach programs.

H. J. Barnum, M.D.
New York, New York

Editor's Note: In Minnesota the following stations will broadcast the programs: KWCM-Ch 10 Appleton, KAVT-Ch 15 Austin, WDSE-Ch 8 Duluth, KTCA-Ch 2 St. Paul/Minneapolis.

Letter to the Editor

Dear Editor:

The editorial by Brown,* raises questions regarding our study of gastric malignancy.[†] The first relates to the accuracy of gastroscopic biopsy in gastric carcinoma. Dr. Brown stated that only one of 15 patients from the group with negative upper gastrointestinal series and positive endoscopies had a positive biopsy. This statement is at variance with the data presented. In this group of 14 (not 15) patients, there were 13 biopsies of which 9 were positive for carcinoma. This is so stated in the article. The point of confusion may relate to the fact that there was one patient thought to have a benign gastric ulcer at endoscopic examination whose upper gastrointestinal series was normal. The biopsy in this patient was positive and is included in the 9 of 13 positive biopsies. It was further pointed out in the review that 35 out of a total of 42 biopsies were positive for carcinoma.

The question is appropriately raised as to how many patients in group I (both roentgenographically and endoscopically positive for carcinoma) needed the endoscopy in view of the radiographic interpretation. The criteria of a positive roentgenographic diagnosis of cancer used in this review allowed even a passing mention of malignancy to be a *positive* diagnosis for statistical analysis of the material. Thus, in many of these instances the endoscopy added considerable support to an otherwise uncertain clinical situation.

The third question and perhaps the most important one asks, "Do the results of the examination in any real way alter the patient's diagnosis or management?" In view of the fact that there was a 63% accuracy of x-ray diagnosis of gastric malignancy it is clear that significant alteration in patients' diagnoses did result from the endoscopic evaluation. Management appeared to be clearly altered also by performance of the endoscopic examination as 87.5% underwent an attempt at curative resection if the gastric malignancy was only evident on endoscopic examination. This stands in contrast to the 29% if both radiologic and endoscopic criteria for malignancy were met.

There is no question that a prospective study would add further information and validity to an analysis of the usefulness of upper gastrointestinal endoscopy. Nevertheless it appears very clear from this report and others cited, that one should not apologize for the performance of upper gastrointestinal endoscopy in view of its proven value.

We believe that hospital days saved prior to definitive diagnosis and therapy justifies the greater expense of endoscopy as opposed to roentgenographic evaluation of the stomach in these patients. Perhaps we should develop a means of performing the examinations with sufficient frequency, facility and availability that the cost could be appropriately reduced if this is shown to be a deterrent. Clearly it should not be one and discussions of its accuracy should not be confused with discussions of its cost effectiveness.

Alphonso A. Belsito, M.D.
Paul B. Dickinson, M.D.
St. Paul, Minnesota

*Brown Philip W, Jr: Gastric malignancy. Gastroscopic experience. Minnesota Med 56:870, 1973.

†Belsito AA and Dickinson PB: Gastric malignancy. Gastroscopic experience. Minnesota Med 56:854, 1973.

Case Report

Multiple Hemangioblastomas of Central Nervous System

LASHMAN W. SORIYA, M.D.,* DANIEL E. NIJENSOHN, M.D.* and
ROSS H. MILLER, M.D.*

IN 1926, LINDAU¹ OBSERVED the presence of hemangiomas of the retina (retinal angiomas) frequently associated with small angiomas of the central nervous system. This disease was then named "angiomas of the central nervous system" and the combination of retinal angiomas with the cerebellar hemangioblastoma came to be known as "Hippel-Lindau syndrome."

Lindau had stated that in 25% of patients with angiomas of the retina, cerebellar or medullary hemangioblastoma or both developed. In an extensive series of cerebellar hemangioblastomas, however, Dandy² found only two instances of associated retinal tumor.

Location

In the central nervous system, hemangioblastomas usually are restricted to the metencephalon and the spinal cord. Only in isolated cases has the site been above the tentorium cerebelli.³⁻⁵ The tumor constitutes 1.1 to 2.4% of all intracranial growths.^{6,7} In the adult, however, hemangioblastomas comprise 7.3% of all primary tumors of the posterior fossa.

Incidence

The peak age incidence is between the ages of 35 and 45 years, with the curve beginning to rise more steeply at 20 years and trailing off between 50 and 60 years of age. Males are more frequently affected than females.

In the cerebellum, paramedian locations were most common, followed by the lateral cerebellar lobes and the vermis. Occasionally the area posterior to the medulla oblongata also was involved. The less involved spinal cord may have an associated syringomyelia.⁷

Associated Lesions

Multiplicity of hemangioblastomas suggests a genetic background of Hippel-Lindau syndrome,^{8,9} especially when associated with angiomas of the retina, non-neoplastic congenital cysts of the pancreas and kidneys, and tumors of the kidneys and

suprarenal glands.

We have had the opportunity, recently, to treat a patient with multiple hemangioblastomas with rather unusual presentations. The renal, pancreatic, or retinal associations were not present, nor were there abnormally high levels of hemoglobin¹⁰ and red blood cells, as have been recorded, probably due to an erythropoietically active substance produced by the tumor.

Report of Case

A 31-year-old man was referred to this clinic with the diagnosis of probable basilar artery aneurysm based on an angiographic study done several days before his admission on February 12, 1972 (Figure 1). His main complaint was unsteadiness and pain in the head and neck of six weeks' duration.

Headache and Neck Pain

The patient had been well until November, 1971, when he began having mild headaches; initially they were described as a "sloshy" feeling inside the head, but later they became a dull persistent discomfort, predominantly bitemporal with radiation to the top of his head. On December 26, 1971, he was awakened by a "falling sensation." When he got out of bed he was quite unsteady; he vomited and noted a sudden sharp pain in his neck, which disappeared within a short time. Over the ensuing two days he felt generally ill with symptoms of

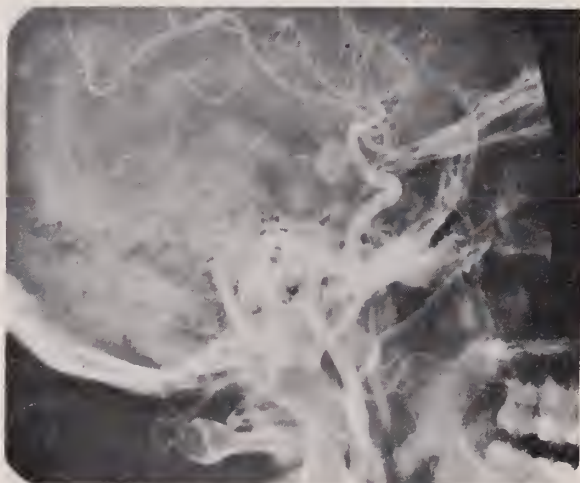


Fig. 1—Right carotid angiogram. Lateral view showing circumscribed vascular mass adjacent and posterior to the supraclinoid portion of the internal carotid artery.

*Mayo Clinic and Mayo Foundation, Rochester, Minnesota.

fatigue and malaise, which he attributed to the flu; however, he felt well enough on December 29 to return to his work. At this time he noted the onset of sharp intermittent pain in his neck, which persisted. This pain increased in severity with any sudden movement, but his neck was not stiff. Intermittent diplopia also was present.

Intermittent Vertigo

The patient had no history of sudden severe headaches or loss of consciousness. He had noted occasional periods of vertigo since December 1971; these were precipitated initially on lowering the head suddenly, but subsequently vertigo would be precipitated on any sudden movement of the head.

On January 3, 1972, the patient consulted his home physician, who prescribed medications for the unsteadiness and aspirin for the neck pain. His symptoms did not subside, however, and on February 2, 1972, he was hospitalized. Cerebral angiography revealed a lesion thought to be a posterior communicating or basilar artery aneurysm. Subsequent to this diagnosis the patient was referred to the Mayo Clinic for surgical treatment. On admission, his systemic review was entirely noncontributory.

Physical examination revealed a well-built man in moderate distress lying still in bed and complaining of a severe headache. His blood pressure was 130/95 mm Hg, pulse 78, and respiration 16.

Neurological Findings

The pertinent clinical findings were horizontal nystagmus increased on gaze to the left; moderate increase in deep tendon reflexes with brisk bilateral extensor plantar responses; slight incoordination in the left upper extremity; and slow, broad-based, and unsteady gait. Neck movement was somewhat limited, especially on extension.

The initial impression at the time of the patient's admission was that he had an indeterminate lesion in the left posterior fossa. The history was more suggestive of a progressive mass than of an acute hemorrhage. The angiogram revealed an opacified mass that appeared to be an aneurysm, but this could not be confirmed on all views of the angiogram.



Fig. 2—Subtraction of lateral view of right carotid angiogram.



Fig. 3—Subtraction of lateral view of left carotid angiogram.

Laboratory Data

The laboratory data on the patient's admission were as follows: hemoglobin 13.1 g/100 ml; hematocrit 38.6%; erythrocyte count 4.09 million/mm³; leukocyte count 8,700/mm³; sedimentation (erythrocyte) rate 50 mm in the first hour; and urinalysis normal. The electrocardiogram and roentgenograms of the chest and head did not show evidence of abnormality. No shift of the midline structures was apparent on the echoencephalogram, and the third ventricle was 6 to 7 mm wide.

Angiography

Angiograms made on February 15, 1972, showed evidence of two vascular masses in and about the sella. One was immediately above and just to the right of the dorsum sellae and was supplied by small branches from the carotid siphon (Figures 2 and 3).

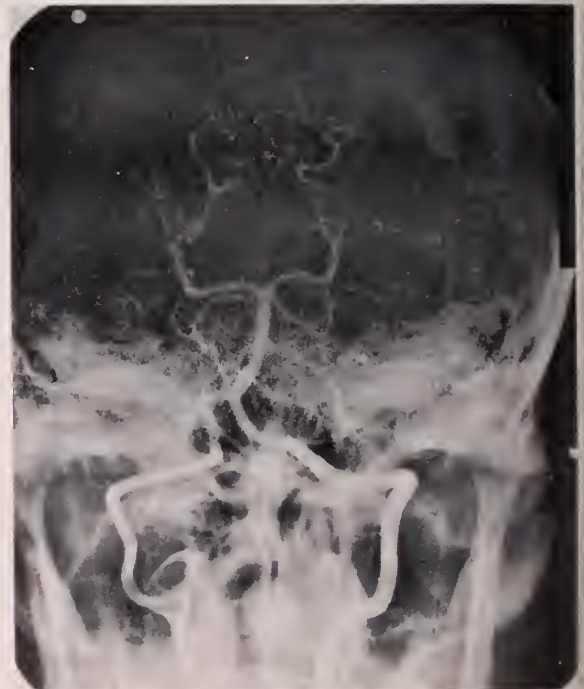


Fig. 4—Anteroposterior view of left vertebral angiogram showing stretching and elongation of vessel over left cerebellar hemisphere.



Fig. 5—Lateral view of left vertebral angiogram showing evidence of mass in left cerebellar hemisphere.

Cerebellar Mass

A third larger but avascular mass was located in the left hemisphere of the cerebellum, causing considerable deviation of the posterior inferior cerebellar artery to the right with stretching of the hemispheric branches (Figure 4). In the center of the large avascular mass was a small vascular nodule, the mass being either a cyst or a hematoma associated with a tumor (Figure 5).

The left cerebellar mass appeared to be responsible for the symptoms and, therefore, the surgeon elected to perform a suboccipital craniectomy and removal of the mass. A cortisone preparation was instituted because of tumor nodules in the region of the sella.

Craniectomy

On February 17, 1972, a suboccipital craniectomy was performed and a cystic hemangioblastoma was removed from the left hemisphere of the cerebellum; it was assumed that the parasellar lesions were similar hemangioblastomas.

Postoperative Course

The patient had an uneventful postoperative course and was dismissed from the hospital on the 14th day after operation. It was deemed advisable to treat the remaining lesions with irradiation to the region of the sella and the interpeduncular fossa. The patient elected to undergo the recommended radiation therapy in his hometown.

Discussion

Intracranial hemangioblastomas¹¹ usually arise in the cerebellum,^{3,12} and the early symptoms are those related to increased intracranial pressure, which results in headache, nausea, vomiting, and papilledema; subsequently, staggering gait with a tendency to swerve to one side, nystagmus, ataxia, diadokokinesis, dysmetria, dizziness, and often ocular rigidity may appear.

References 1-13 will be found on page 1078.

Cause of Symptoms

Dandy² and also Sargent and Greenfield¹² remarked that the symptoms are not due to the usually insignificant tumor but to the increasing size of the cyst. The cyst, by compression of the aqueduct of Sylvius or the fourth ventricle, accounts for the increased pressure and hydrocephalus.

Small Capillary Tumor

The actual tumor is usually small and is incorporated in the wall of a cyst as a mural nodule. The tumor is firm to the touch, and microscopic examination reveals blood spaces and channels of capillaries with endothelial lining in the sinuses within the tumor.

Differential Diagnosis and Prognosis

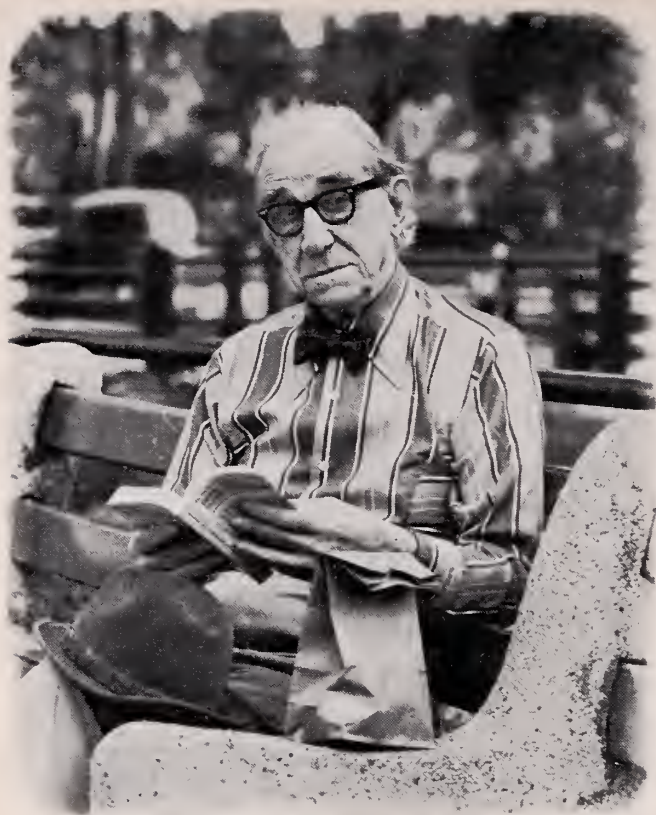
The differential diagnosis on the clinical findings of cerebellar involvement runs the usual very broad gamut of disease processes. When a solitary hemangioblastoma of the cerebellum is identified, surgical removal of the tumor provides a good prognosis. The recurrence or the development of another tumor from a minute hemangioblastoma, however, is impossible to foretell, although such instances have been reported.¹³

An unanswered question also is the advisability of follow-up angiograms in patients who have had a hemangioblastoma removed from one location. Cerebellar hemangiomas and hemangioblastomas usually are single tumors but they may have multiple lesions demonstrated by angiography at initial study. Symptoms of other lesions may develop later.

The case reported is interesting because of the unusual locations of the multiple lesions.

Summary

Hemangioblastomas usually arise in the cerebellum as solitary tumors. They are frequently associated with other lesions such as pancreatic cysts, polycystic kidneys, and retinal angiomas (von Hippel-Lindau disease). Multiplicity of the tumor is most uncommon. Supratentorial location of the tumor has been found to be extremely rare. We are reporting the case of a patient with multiple hemangioblastomas located in the parasellar region and in the cerebellum. The initial angiographic studies were diagnostically misleading. The cerebellar tumor was responsible for the symptoms and it was surgically removed.



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Clinical Path Conference

Lymphadenopathy in a 64 Year Old Female

ROBERT A. GREEN, M.D.* and DAVID W. GAUGER, M.D.†

Dr. M. Khan:

This 64-year-old white woman was admitted on 6/8/72 with a 12 day history of night sweats, malaise, myalgia, headache, and anorexia. She had recently been seen in the E.R. with similar complaints, and this was thought to be a viral infection. She complained that these symptoms were not resolving, and that she wanted admission to the hospital. There was no other contributory history recorded in her chart.

The patient had gallbladder surgery in 1951. She gave a history of arthralgia since 1966, and this was diagnosed as degenerative arthritis. She had a negative workup for collagen disease in the past. The patient was a widow and lived alone. She had three adult children living in Minneapolis. She denied smoking and drinking. There was no history of allergies.

Physical Examinations

BP 130/70, P 92 and regular, T 99.4 and R 18/min. She was a pleasant, cooperative lady with questionable icteric appearance. Head was normocephalic. Eyes showed slight A-V nicking; pupils reacted equally to light and accommodation. Mouth was edentulous and without lesions. Neck was supple; there was no thyromegaly. Multiple, enlarged, firm and nontender lymph nodes were palpable in both anterior and posterior cervical areas bilaterally. She also had bilateral axillary lymphadenopathy. Breasts showed no masses. Lungs were clear to auscultation and percussion. Heart had a regular rhythm, and there were no murmurs. Abdomen showed an old epigastric scar. A nontender liver was palpable 7 cm. below the costal margin. Spleen tip was also palpable. There were no other masses in the abdomen. She had bilateral, inguinal lymphadenopathy. Pelvic examination revealed a cystocele. Rectal examination revealed no masses. Stool was brown in color and guaiac negative. There was no edema of the extremities. Peripheral pulses were good. A right epitrochlear node was palpable. Neurological examination was essentially unremarkable.

Laboratory Data

At the time of admission—hgb. 12.5 gm. %, hct. 38.7%, WBC 13,500 (83% neutrophils, 12% lymphocytes, 4% monocytes, and 1% eosinophils) and platelet count 300,000. Electrolytes were normal, and the remainder of the SMA-12 showed a total protein of 6.4 gm%

with albumin of 2.5 gm%. Calcium 8.7 mg%, alk. phos. 23, total bilirubin 1.1 mg%, BUN 16, blood glucose 97, and SGOT 17. Admission chest Xray showed widening of the mediastinum, which appeared to be consistent with enlarged lymph nodes.

Course

The patient had a low-grade fever. She was investigated for an infectious process. Routine blood and sputum cultures and skin tests (intermediate PPD, mumps, Trichophyton) were negative. In the first week of hospitalization, she had a barium enema and an upper G.I. series done. Barium enema was reported as negative, but the upper G.I. series revealed a large spleen and liver with the spleen causing indentation on the left side of the stomach.

Small bowel follow-through revealed the duodenal bulb to be displaced beyond the normal upper limits from the anterior margin of the vertebral bodies. This was felt to be due to a retrogastric or retroperitoneal mass. She continued to have a low-grade fever, felt weak and anorexic. Her white count ranged between 10,000 and 19,000 with a differential of 60-80% neutrophils. The platelet count remained within normal limits. Hemoglobin remained stable at around 12 gm%. Prothrombin time was 10.8/11.5, PTT was 26.0/35.4. Renal and liver function tests were within normal limits. ESR was 32 mm.

Axillary Node Biopsy

During her second hospital week (on the eighth hospital day) she had a right axillary lymph node biopsy done. The diagnosis was atypical lymphadenitis of undetermined etiology. Bone marrow was hypercellular. Peripheral blood smear revealed normochromic normocytic anemia, leukocytosis and a mild leukemoid reaction. Smear and culture of the lymph node material for fungi, AFB, and Brucella were reported as negative. Blood serology for Brucella, cocci, histo, and blasto was also reported as negative.

Other Diagnostic Procedures

During her third week of hospitalization, she continued to run a low-grade fever. An IVP done at this time showed normal function on both sides; however, there was splenomegaly and hepatomegaly detected. The right kidney appeared to be depressed downward because of an enlarged liver. The following laboratory tests were reported as negative: FANA, Heterophile x 2, viral serology for adenovirus, influenza A & B, and cold agglutinins; VDRL, Sabin-Feldman dye test for toxoplasmosis; complement fixation test for toxoplasmosis,

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and serology for Psittacosis and tularemia. Liver biopsy was also reported as normal. A repeat biopsy of the lymph node from the L. cervical area was done, and this again was non-diagnostic, showing only reactive lymphadenitis. The patient continued to feel weak, tired, and anorexic. She was becoming depressed because of the multiple diagnostic procedures being performed on her. During this period, she also developed dependent edema of the legs. Chest Xray revealed evidence of congestive cardiac failure and bilateral pleural effusion. A thoracentesis was done, and the pleural fluid revealed 1600 white cells with 15% neutrophils and 85% monocytes. Gram stain and culture was negative. AFB smear on the fluid was also negative. The fluid had a protein content of 43 mg% and sugar of 105 mg%. The fluid was also negative for tumor cells. A lung scan was done which was reported as negative. A second-strength PPD skin test was also negative. Urine culture grew out more than 100,000 colonies of *E. coli*, and this was treated with Ampicillin.

Events Before Laparotomy

During her fourth hospital week she continued to run a low grade fever. A repeat second strength PPD was negative. On the 22nd hospital day, a lymph node biopsy was performed for the third time. This time a right axillary node was removed. The pathology report read "atypical reactive lymph node." Smear of lymph node imprints were again negative for AFB and fungi. Hgb. was now around 10 gm%, and white cell count was between 13,000 and 20,000. Reticulocyte count was 2.3%. Platelet count remained within normal limits. Serum electrolytes, liver function tests and serum uric acid were within normal limits. It was felt that her lymph nodes had tripled in size since admission. These nodes were nontender and firm in consistency. The liver was palpable 16 cm. below the right costal margin and was firm and nontender. The spleen was also easily palpable. During this period a holosystolic murmur was heard at the RSB in the second intercostal space. Because of this murmur, the possibility of SBE was entertained, and multiple blood cultures were done. All of these blood cultures were reported as negative. The patient seemed to be following a gradual downhill course, and as there was no definite diagnosis established, the patient underwent laparotomy on the 44th hospital day.

Discussion

Dr. Robert Green:

This patient presented with complaints which sounded much like an infection and her early course was thought to be due to viral disease. Her subsequent evaluation included extensive studies to rule out the possibility of infection. With failure of her symptoms to resolve, she was finally admitted to the hospital for a work-up.

The past history, the social history, family history didn't contribute much to her evaluation. The physical examination was notable for generalized lymphadenopathy and hepatomegaly with

moderate enlargement of the spleen. So far, then the staff was presented with the differential diagnosis of generalized lymphadenopathy in an elderly female with fever, and the diagnostic possibilities seemed to be limited to some unusual infectious process or to a malignancy, most likely a malignant lymphoma.

Her laboratory data at the time of admission were not specific. She had a low serum albumin suggesting some albumin synthesizing defect, probably as a result of chronic illness. Xrays showed widening of the mediastinum consistent with her widespread peripheral lymphadenopathy.

Almost every conceivable type of test was done for infection without any significant findings. This included a dye test for toxoplasmosis, presumably considering the possibility of a lymphadenopathic type of toxoplasmosis. One test that was not done was an NBT (nitroblue tetrazolium) test which is sometimes very helpful in distinguishing between bacterial infection and malignancy. It is not helpful in distinguishing viral disease from a malignant process.

Other x-ray studies showed no diagnostic features, but confirmed the presence of a large spleen and liver. Displacement of the duodenal bulb suggested the possibility of a retroperitoneal mass.

A frustrating problem was that of repeated non-diagnostic lymph node biopsies. The bone marrow also failed to show any abnormal disease process, and finally, a biopsy of the enlarged liver was also reported as normal. A liver scan is not reported in the protocol.

She developed signs suggesting congestive heart failure with bilateral pleural effusion. A thoracentesis was done and the findings suggested that the effusion was a transudate but didn't show malignant cells.

Her course was characterized by continuous deterioration and low-grade fever. Bacterial endocarditis was considered because of the development of a systolic murmur and her cardiac problems, but multiple blood cultures were negative. After six weeks, a laparotomy was done. In the absence of findings suggesting malignancy in the kidney or elsewhere, and particularly with the findings of generalized lymphadenopathy and hepatosplenomegaly and despite multiple negative tissue biopsies (nodes, liver) malignant lymphoma was far and away the likeliest diagnosis here and laparotomy the logical next step.

Laparotomy Findings

Dr. David W. Gauger:

At the time of laparotomy, several lymph nodes from the region of the greater omentum were removed. The liver was biopsied and the patient had a splenectomy. The spleen weighed 496 grams. The material obtained at the time of laparotomy was shown to several pathologists. The majority felt this was a malignant process; however, they wanted to be sure that various infectious processes including mononucleosis, rheumatoid arthritis, and granulomatous disease were not present. No Reed-Sternberg cells were identified in the biopsy material. The patient was given the diagnosis of malignant lymphoma, well differentiated, diffuse lymphocytic type with involvement of the spleen and liver.

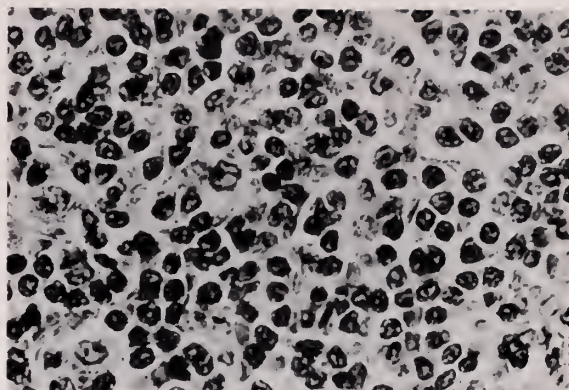


Fig. 2—Oil immersion of the lymph node in Figure 1 revealing the lymph node to be composed of a diffuse pattern of lymphocytes. 100X

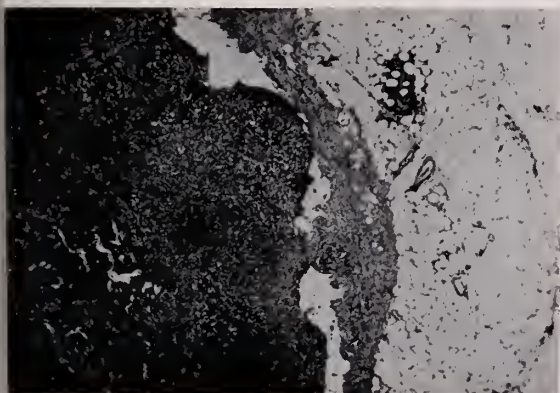


Fig. 1—Lymph node from greater omentum revealing replacement of the normal architecture by a diffuse pattern of malignant cells. 4X



Fig. 3—Liver biopsy revealing infiltration of the portal regions by mononuclear cells with the same cytoarchitecture as in Figures 1 and 2. 4X

TABLE
Classifications of Malignant Lymphomas*

Current Classification Modified from Gall and Rappaport (1958)	Jackson and Parker Clas- sification (1947)	Custer and Berhard Clas- sification (1948)	Berman Classification (1953)	Gall and Mallory Clas- sification (1942)	Other Synonyms
Malignant Lymphoma Well Differentiated Lymphocytic Type (Nodular/Diffuse)	Lymphocytoma	—	Lymphocytic Lymphoma	Lymphocytic Lymphoma	Aleukemic Lymphocytoma Lymphocytic Lymphosarcoma
Malignant Lymphoma Poorly Differentiated Lymphocytic Type (Nodular/Diffuse)	Lymphoblastoma	—	Lymphoblastic Lymphoma	Lymphoblastic Lymphoma	Lymphoblastoma Lymphocytic Sarcoma Lymphoblastic Lymphosarcoma
Malignant Lymphoma Mixed Lymphocytic Type (Nodular/Diffuse)	—	—	—	—	Reticulolymphosarcoma Mixed Cell Lymphoma
Malignant Lymphoma Histiocytic Reticulum Cell Type (Nodular/Diffuse)	Reticulum cell Sarcoma	Reticulum cell Sarcoma	Reticulum cell Sarcoma	Clasmatocytic Lymphoma	Dictyocytic Reticulosarcoma Dictyosyncytial Reticulosarcoma Reticulum Cell Lymphosarcoma
Malignant Lymphoma Stem Cell Type (Diffuse only)	—	—	—	Stem Cell Lymphoma	Reticulum Cell Sarcoma Malignant Lymphoma, Undifferentiated
	Giant Follicular Lymphoma	Follicular Lymphoma	Follicular Lymphoma	Follicular Lymphoma	

*Permission given by Robert E. Scott, M.D. to publish this chart appearing in his article published in the Bulletin of the Bell Museum of Pathology, University of Minnesota, Publication #3, Winter, 1973.

Staging

Dr. Green:

Had this patient had positive tissue diagnosis on the basis of peripheral node biopsy, it would be clear that she had advanced disease above and below the diaphragm and was symptomatic in the sense that she had fever, anemia and weight loss. Under these circumstances, further staging procedures on which treatment decisions would be based would not be necessary.

Staging of non-Hodgkin's lymphoma is similar to that of Hodgkin's disease except in the use of separate classification for primary extra-nodal disease which has a different prognosis from primary nodal disease.

Stage I disease represents disease limited to a single lymph node group.

Stage II designates disease in which two or more lymph node groups above or below the diaphragm are involved.

Stage III represents disease limited to lymph nodes but including disease above and below the diaphragm.

Stage IV represents disseminated nodal and extra-nodal (visceral, skeletal, marrow, etc.) disease.

Extra-nodal non-Hodgkin's lymphoma includes primary involvement in Waldeyer's ring, such as nasopharyngeal lymphoma, bone, G.I. tract, thyroid, etc. Many of these patients with localized extra-nodal disease have a very favorable prognosis. They are considered separately for therapy, but as in apparently localized nodal disease, to prove that they are localized, they should have additional staging procedures.

In staging non-Hodgkin's lymphoma, a good physical examination is, of course, essential. X-ray studies should include chest X-ray for evaluation of the mediastinum particularly, intravenous pyelogram primarily for evaluation of ureteral deviation by retroperitoneal nodes, and skeletal X-rays, particularly in the presence of skeletal symptomatology.

Laboratory studies in addition to routine blood counts and peripheral blood morphology should include bone marrow aspiration and trephine biopsy, liver function studies and isotope liver scan.

Bone marrow biopsies are positive in a variable percentage, but as high as 40-50 percent in certain types of cases. They are significantly higher in lymphocytic lymphoma than in histiocytic types, more common in advanced clinical stages and

more common in more undifferentiated histologic varieties of lymphoma.

Liver function tests are often not helpful, being quite variable and they cannot be depended on for evidence of liver involvement. Liver scan on the other hand may be quite helpful, probably more so than in Hodgkin's disease.

Lymphangiography

Lymphangiography is still an important study in non-Hodgkin's lymphoma and is recommended in all cases except obvious Stage III and Stage IV patients. The percentage of positives are variable in different series, but a common experience is to find a positive lymphangiogram in a patient who is thought almost certain to have Stage I or II disease before lymphangiography.

Finally, there are a number of cases in whom laparotomy must be done either for diagnosis or because the treatment decision may depend on findings in the abdomen not recognizable by other evaluation. It is particularly helpful in the diagnosis of liver involvement not otherwise suspected. Because localized disease is so much less common in non-Hodgkin's lymphoma, laparotomy will perhaps not need to be done as frequently as in the staging of Hodgkin's disease, but there will still be patients who will change from Stages I and II to Stage III or IV as has been shown by Hanks et al.¹²¹ in a study in which three out of nine clinical Stage I and II patients were changed to III or IV at laparotomy.

Generally speaking, one would tend to use the same criteria in non-Hodgkin's lymphoma as in Hodgkin's disease if other criteria were negative for disease involvement below the diaphragm. Laparoscopic study of the abdomen with needle biopsy under direct vision is a worthwhile procedure in some cases.

Interval History

Dr. Gauger:

The patient was placed on chemotherapy (prednisone and cytoxan) in June of 1972 following the laparotomy and was seen regularly in the Hematology Clinic. The patient was admitted to Hennepin County General Hospital on December 30, 1972 because of a persistent fever of up to 105°F. The patient had last been seen in the Hematology clinic at Hennepin County General Hospital on November 29, 1972, at which time her hemoglobin was 13.1 white count 14,300 and platelets

count was 435,000. She had been continued on her prednisone and cytoxan at that time.

At the time of admission to Hennepin County General Hospital in December of 1972, the patient was felt to be septic, so after doing multiple bacteriological cultures, the patient was started on gentamycin and keflin. The patient received prednisone and cytoxan for the first two days of hospitalization. White blood cell count was 23,000 with 99% neutrophils and the hemoglobin was 11.0 at the time of admission. SGOT was 30, serum protein was 5.8 with an albumin of 2.1, bilirubin 1.2, and BUN 22. Chest Xray revealed widening of the upper mediastinum which was felt to be due either to widening of the ascending aorta or enlargement of the lymph nodes of the anterior mediastinum. Micro-biological examination of the patient revealed *Candida albicans* in the sputum and *Klebsiella Enterobacter* and *Pseudomonas* in the throat culture.

The patient's fever was normal on the fourth hospital day. It was noted at this time that the patient's BUN was beginning to increase and her urine output was decreasing. After eight days of therapy, the gentamycin and keflin were discontinued. On the third hospital day the patient's white count was noted to be 5,200 and this continued to drop to a level of 900 with 100% lymphocytes on the eighth hospital day and the day prior to the patient's death. The hemoglobin at this time was 8.7. On the eighth hospital day, the serum potassium was 5.9, sodium 126, albumin 0.8, and BUN 82. The patient expired on the ninth hospital day.

Autopsy Examination

The deceased was a thin, cachectic, white female with a weight of 105 pounds and a height of five feet four inches. Examination of the head revealed alopecia. There were extensive adhesions present within the abdominal cavity. The spleen was absent. Examination of the thorax revealed bilateral pleural effusions composed of a straw-colored fluid.

There was extensive lymphadenopathy involving the hilar regions of the lungs bilaterally consistent with the x-ray findings. The most prominent mass was anterior to the right main stem bronchus and measured 8 cm. x 4 cm. x 3 cm.

Microscopically this mass consisted of lymphoid tissue which showed marked depletion of the cells and focal areas of necrosis. These changes were

felt to be secondary to the chemotherapy that the deceased had received. Examination of the liver revealed this to be 2,500 grams. Mild fatty metamorphosis was present, as well as centrilobular congestion. The mononuclear cell infiltration of the portal regions in the liver biopsy obtained during the laparotomy were no longer present at the time of autopsy. This depletion of cells was felt to be secondary to the patient's chemotherapy.

Examination of the bone marrow post mortem revealed this to be hypoplastic. The kidneys were symmetrical in size and had a combined weight of 450 grams. Microscopic examination revealed evidence of acute tubular necrosis which was characterized by interstitial edema and a bimorphic appearance of the renal tubules with evidence of regeneration of the distal convoluted tubules.

The heart weighed 320 grams. There was thickening and calcification of the mitral valve. There was no evidence of an active inflammatory process at the time of autopsy. There was evidence of interstitial myocardial fibrosis. There was no evidence of acute myocardial infarction using hematoxylin eosin stain or the Hematoxylin Basic Fuchsin Picric acid stain.

Final anatomic diagnoses:

1. Malignant lymphoma, well differentiated, diffuse lymphocytic type, Stage IV.
 - A. Post chemotherapy for malignant lymphoma.
 - B. Generalized lymphadenopathy with hepatomegaly.
 - C. Post splenectomy.
 - D. Terminal leukopenia and anemia.
 - (1) Hypoplastic bone marrow with pancytopenia.
2. Acute tubular necrosis, kidneys.
 - A. Post gentamycin therapy with evidence of terminal renal failure.
3. Calcified thickened mitral valve.
4. Interstitial myocardial fibrosis.

Treatment

Dr. Green:

Several features of the natural history and histologic characteristics of non-Hodgkin's lymphoma influence treatment decisions and prognosis. Unlike Hodgkin's disease, spread often appears to be by non-contiguous routes in contrast to the orderly progression in most patients with Hodgkin's disease. Skip involvement is common, bone marrow involvement is common and a high percentage of

patients already have Stage IV disease at the outset.

Nodular Vs. Diffuse Pattern

In considering histopathology and its effect on outcome, the nodular pattern offers a better prospect for survival than does the diffuse type of disease and there is a significantly better prospect for patients with more differentiated histology. Well differentiated lymphocytic lymphoma generally has a much better outlook for survival than does poorly differentiated disease or histiocytic lymphoma.

Radiation Therapy

Radiation therapy is the treatment of choice when adequate amounts can be given and when areas of involvement are limited. In proven Stage I and II patients and possibly in some Stage IIIa patients, intensive radiation is the treatment of choice. In primary extra-nodal disease, radiation therapy is certainly the treatment of choice since it really offers a curative prospect. As in Hodgkin's disease, the cure of non-Hodgkin's lymphoma, treated with radiation, is dose related and high dosages in the range of 3,500 to 4,000 rads to the areas of involvement must be given if the intent is to cure.

Stages III and IV

In some patients with Stage IIIa disease, combination treatment may be best, using chemotherapy plus radiation to areas of bulky involvement.

Since perhaps more than half the cases are Stage IIIb and IV, the use of radiation therapy is often not applicable. Total body radiation is now undergoing randomized study with combination chemotherapy in these cases, but the end results of this study are not yet known.

The same general principle applies in chemotherapy of non-Hodgkin's lymphoma as in Hodgkin's disease, namely, that intensive, combined, relatively short-term therapy is more effective than long-term, low dose, single agent therapy. Of the various drugs, Cytoxan is probably the most effective and appears to be more effective than nitrogen mustard in this group of diseases. Similarly vincristine (Oncovin) tends to be more effective than Velban in non-Hodgkin's lymphoma. Single agent therapy results in 10 to 15 percent complete remission with remissions of relatively brief duration.

Because of this lower response and short survival period, combination therapy using Cytoxan, vincristine and prednisone is now the treatment of choice for non-Hodgkin's lymphoma. Treatment is generally given in some type of COP or CVF schedule.

Schedule for Treatment

An example of the former is the schedule used by the Southwest Cancer Chemotherapy Study Group in which Cytoxan is given in dosage of 800 mg./m² intravenously every two weeks, vincristine 2 mg./m² intravenously on day one, and prednisone in dosage of 60 mg./m² by mouth daily for five days. The schedule is repeated every two weeks for six courses. If complete remission is achieved, four additional courses are given at two week intervals. Maintenance appears to prolong duration of remission and survival.

It is important to be aware of the patient's bone marrow reserve in this as well as in any other intensive combined treatment program for lymphoma. Patients with previous intensive radiation and/or intensive chemotherapy will have to be treated less vigorously in terms of lower doses of Cytoxan and vincristine.

The other schedule (CVP) is that of Bagley et al.³ which includes Cytoxan in dosage of 400 mg./m² by mouth daily for five days, vincristine 1.4 mg./m² intravenously on day one, and prednisone 100 mg./m² orally for five days. This course is repeated every 21 days and as in the previous schedule, close attention must be paid to the status of bone marrow reserve.

A 50 to 60 percent complete remission rate is expected with this type of schedule in lymphocytic lymphoma with remission of many months' duration. In complete responders, a high percentage live two years and more.

Of the new drugs, BCNU, a nitrosourea, will produce remissions perhaps in as many as 30 percent of cases refractory to the other drugs, but is probably more effective in Hodgkin's disease than in non-Hodgkin's lymphoma. Bleomycin has produced responses in up to 50 percent of patients and is particularly useful in those with very low bone marrow reserve as a result of previous therapy because Bleomycin is unique in causing little or no myelo-suppression. Adriamycin, a new investigative drug, has produced remission in as high as 60 percent of cases of lymphoma even in patients previously treated with other agents.

References 1-12 will be found on page 1070.

Graduation 1973*

J. R. LARSON, M.D.

TODAY IS WITHOUT a doubt a milestone in each of the lives of the graduating seniors in the class of 1973 of the University of Minnesota Medical School. Much has happened since that September day in anatomy when we opened the cadaver cases for the first time.

Orientation, yes, remember orientation; that was when the Dean told us that we were the biggest, the smartest and the best class ever to enroll at the University and I think that most of us even believed him, and maybe still do. We have become somewhat disillusioned, however, since then he has also told every other new class that they were the biggest, smartest and best class.

Yes, a lot has happened since that first day. Some of us have grown our hair longer and some of us have lost what hair we started with. Yes, some good times and some bad. But today first of all, I think that we should stop for a moment and thank those that have helped us along the way. Without them it would have been very difficult. Loved ones, parents, faculty, friends and last but not least, our health profession loans; we thank you.

Today is a milestone, for today we probably know more didactic medicine than we will at any other time in our future careers. This reminds me of the story of the old physician giving advice to his grandson. If you ever get in trouble with the law, secure for your guidance an elderly attorney who is experienced in the ways of the law and wise in the ways of the court, but if ever you get sick, I would advise you to get a physician just out of training, because never again will he know as much as he knows at that moment.

Medical school, I must admit, has been quite an experience. Compared to undergraduate education where college is thought of as a fountain of knowledge where students come to drink; medical school is like drinking out of a fire hydrant. Some describe medical school with the

three P's: petulance, parsimony and pedantry. Others, a minority of course, describe medical school as just purely a dehumanizing experience established solely to subject the students to long periods of stress. Although each of these descriptions has shades of truth, I think medical school was and is much more.

We have come a long way since the Flexner report in 1910 which gave the duty of medical education to the university centers. When you think of it, it is quite a monumental task to educate a diverse student body for diverse roles in the future, not knowing what the future will bring, and only having the tools of present day knowledge that have proven to be outmoded with a half-life of less than seven years. The medical school's job is only vaguely defined as that body which must provide basic knowledge and skills which are common and necessary to all physicians. But with specialization increasing at such a fast rate, the parts seem to be running away with the whole. The faculty, therefore, must be very selective in their presentations. Out of this selectivity, thus evolved the concept of the "core curriculum." The basic core that every physician should know. This then is the "new curriculum." The curriculum designed to eliminate all the ancillary material and to present only the "meat and bones" of medicine. But as we tried to define core, we found out it was a very difficult job. The definition seemed to vary greatly with each group trying to make the definition. But even more vague, now supposedly that we have mastered this elusive core as we are graduating today, is how are we going to apply this to ourselves and to the future practice of medicine.

I think medicine could be compared to an ecologist standing in a river catching debris as it floats by and not going up stream to find out why it is in the river in the first place. Past physicians in our health care delivery system have been involved mainly by necessity in crises care. That is, when the body breaks, you try to fix it. Excellence in the past in our health care system, has been a quantitative judgment. In

*Response given in behalf of Senior Class in Medicine, University of Minnesota, by their President, at the recognition exercises honoring the class, June 8, 1973.

other words, provide more of the same for everyone and hopefully do it at a lower cost.

Health was defined in 1947 by the World Health Organization as the "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." "The winds of change in health care are the winds of gale force." Americans desire better medical care and want it available to all. No longer is medical care just a social objective but it has become defined as a personal right to be fulfilled. The once quiet and passive consumer now gives urgent voice to new expectations. As Lord Bacon once defined knowledge as being power, we are now and even more so in the future dealing with an increasingly more knowledgeable public from all economic levels. More knowledgeable that is, in the needs and rights of medical care rather than the arts of medicine.

As the goals of our education in trying to define a core curriculum have been quite vague, the boundaries and future goals of health care are vague and very ill-defined. If I may quote Dr. Robert Ebert, dean of the Harvard Medical School, "To provide increased numbers of physicians to rural areas will not meet the need. To do this without other changes will accomplish only what has been achieved in urban areas, a misuse of physicians and a perpetuation of a non-system of medical care." He goes on to say that "it is fruitless for medical schools to experiment with curriculum changes designed to produce general physicians unless they are willing to identify

and study objectively the faults of the system of medical care which we now provide."

There can be no doubt in our mind's eye that the health care delivery system in America will soon change. I think that there can be no doubt that it is to everyone's best interest that we as physicians change with it and because of the vagueness in any system of health care, hopefully lead it. At present with the ever enlarging sense of responsibility for national and individual health the expansion of government's role appears as only a logical consequence. But if I may quote Abraham Lincoln, "the legitimate object of government is to do for a community of people whatever they need to have done but cannot do at all or cannot do as well for themselves by their separate individual capacities. In all that the people can do as well for themselves the government ought not to interfere."

The call and the expectations are there. In the past, we as physicians have not taken a primary role. We have not shown that we could individually expand the system and make it more just.

The public has waited for us, but I do not think that they will wait much longer. Change will be made soon, so before too much longer we as physicians had better become medical statisticians as well as medical physicians and prove and hopefully oversee a new improved health care delivery system which already has been defined as within the rights of society.

Minnesota Academy of Family Practice

Minnesota Academy of Family Practice announces its Third Midwinter Seminar January 26th to February 2, 1974 in the Caribbean. Info; MAFP, 214 East Main, Waterville, Minnesota 56096.

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Antibiotic Prophylaxis for Bacterial Endocarditis

Necessity or Tradition?

EDWARD L. KAPLAN, M.D.†

THE RECENT PUBLICATION of the American Heart Association's revised recommendations for the prevention of bacterial endocarditis again focuses attention on this problem and the necessity for some of the recommended measures.¹ Bacterial endocarditis still kills.²⁻⁷ On the other hand, it is not a common disease; the average physician rarely sees a patient with bacterial endocarditis. Furthermore, data supporting the use of antibiotic prophylaxis with some of the more commonly performed procedures in dental, surgical and medical practice are not as convincing as many physicians require. Thus, the seriousness of bacterial endocarditis, its relative rarity in clinical practice, and the justifiably questioned efficacy of many methods of antibiotic prophylaxis often render inconsistent the clinical application of some of the principles of bacterial endocarditis prophylaxis.

In considering approaches to this problem the fundamental questions which initially must be answered and then justified before rational implementation of antibiotic prophylaxis to prevent bacterial endocarditis are: which patients and what procedures require antibiotic prophylaxis and, secondly, are there data available to justify these practices?

Although many of the pathogenetic factors which favor the development of bacterial endocarditis are not fully understood, epidemiologic data strongly suggest that the presence of underlying structural defects of the heart or great vessels increase susceptibility to bacterial endocarditis. Vegetations of bacterial endocarditis do occur on normal heart valves, but only rarely in otherwise healthy individuals (in contrast to patients with underlying debilitating diseases). Thus, patients with such diverse conditions as congenital heart disease (with very few exceptions such as uncomplicated atrial septal defects), acquired valv-

ular heart disease (such as rheumatic or calcific valvulitis) or even those few patients who have had a previous bout of bacterial endocarditis on an otherwise normal valve would appear to be included in the group of patients with increased risk.

One other important question to be answered before antibiotic prophylaxis can be justified is: Does *any* bacteremia following a dental or surgical procedure *always* imply susceptibility to the subsequent development of bacterial endocarditis? This, too, is a difficult question to answer for diverse factors such as the age of the patient, the type of underlying heart disease, the species of bacteria involved, and the "dose" of bacteria in the blood stream have all been cited among the many factors which may influence the answer.⁸

It would appear that while bacteremia with certain organisms, such as many gram negative bacteria, may lead to sepsis, certain bacteria (such as *Streptococcus viridans* and *Streptococcus fecalis*) seem to have a greater propensity to cause bacterial endocarditis. Endocarditis prophylaxis is usually directed against organisms of this type.

With these questions in mind, it is the purpose of this paper to briefly review examples of some of the procedures for which antibiotic prophylaxis to prevent bacterial endocarditis have been suggested, pointing out not only the rationale for prophylaxis, but raising questions where prophylaxis seems dictated by tradition rather than by carefully obtained data.

Data regarding the efficacy of antibiotic prophylaxis for bacterial endocarditis, upon close scrutiny, appear to define three broad groups of procedures: First, those conditions from which the best data have been obtained to demonstrate justification for antibiotic prophylaxis; secondly, those situations for which supporting data are available, but because of remaining unanswered questions the need for prophylaxis is still unresolved; and finally those procedures for which there may be adequate theoretical justification for antibiotic prophylaxis, but there are very little, if any, sup-

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porting data to assist the physician with clinical decisions.

As an example of the first category, *dental procedures* are undoubtedly among those procedures which require frequent consideration for antibiotic prophylaxis. Most dental procedures—including tooth extraction, periodontal surgery, endodontia, dental prophylaxis and restoration, among others—have been shown to lead to bacteremia.⁹⁻¹¹ The important factor predisposing to bacteremia common to all of these procedures is thought to be gingival bleeding. The occurrence of gingival bleeding is very often difficult, if not impossible, for the dentist or oral surgeon to predict. The fact that there is disagreement in the literature regarding the extent of gingivitis necessary to produce bacteremia does not clarify matters.^{12,13} The multiplicity of bacteria—both aerobes and anaerobes—recovered from blood stream of patients following dental procedures is impressive.¹⁴ An important point, one which places dental procedures in the first group, is that the organism probably most commonly associated with the subacute form of endocarditis, *Streptococcus viridans*, is an important inhabitant of the oropharynx. Furthermore, the proximity of dental procedures to the recognition of bacterial endocarditis has been commented upon numerous times. This suggests at least a temporal, if not a causal relationship between bacteremia—in this case induced by dental procedures—and the subsequent development of bacterial endocarditis. Therefore, it has been recommended that antibiotic prophylaxis be given with *all* dental procedures that are likely to cause gingival bleeding.^{1,15} Contrary to what is often practiced by many physicians and dentists, this recommendation would encompass even routine cleaning of teeth, for gingival bleeding very often is associated with this procedure. The recommendations for antibiotic prophylaxis to prevent bacterial endocarditis would appear to be warranted for children with underlying heart disease as well as for adults. Even though there have been attempts to place children in a separate risk category¹⁶ the available data do not support a difference in the risks for these two groups.^{17,18}

The second category includes surgical procedures for which there are available data to support the use of prophylactic antibiotics to prevent bacterial endocarditis, but aspects of the supporting evidence are considered controversial by some physicians. Two examples seem most ap-

propriate to mention: One, genitourinary tract procedures, is more frequently encountered by the practicing physician than is the other, cardiovascular surgery.

Bacteremia has been documented following *genitourinary tract procedures* ranging from catheterization of the urinary bladder to transurethral resection of the prostate.^{3,19,20,21} What often makes the decision regarding antibiotic prophylaxis to prevent bacterial endocarditis confusing for the physician whose patient is about to undergo a genitourinary tract procedure is the fact that organisms most commonly recovered from blood following these procedures are ones present in urine *prior* to the procedure.²² These are most often gram negative organisms. While these organisms may produce very serious illness such as gram negative shock, they are less commonly mentioned in the literature as a cause for infective endocarditis following urinary tract manipulation. Enterococci, not gram negative bacilli, have been shown to be a frequent cause of bacterial endocarditis following genitourinary tract procedures and it is against these organisms that most commonly used prophylactic regimens are directed.¹

Bacterial endocarditis following *cardiovascular surgery* is feared by surgeons and cardiologists alike. It is not uncommon in the perioperative or postoperative periods, especially following placement of prosthetic heart valves.²³ Data are available which report a decrease in infections—including endocarditis—following cardiovascular surgery with the use of prophylactic antibiotics in the perioperative period.^{24,25} However, conflicting data are also available which show no reduction in the frequency of postoperative infections, when antibiotic prophylaxis is utilized.²⁶ While most cardiovascular surgeons employ antibiotics in the perioperative period, well controlled studies are required to ultimately answer this question.

Since the organisms most frequently responsible for this complication are *Staphylococcus aureus* (coagulase positive) and *Staphylococcus epidermidis* (coagulase negative) antibiotic prophylaxis to prevent bacterial endocarditis in the perioperative period is usually directed toward these organisms.¹ Other organisms such as gram negative bacteria may cause endocarditis following cardiac surgery, but there are no universally effective methods of antibiotic prophylaxis for this group of organisms.

A note should be added here regarding the postoperative management of patients in the years following cardiovascular surgery. It has been suggested that with few exceptions (e.g., secundum atrial septal defect repaired without a patch, and ligated and divided patent ductus arteriosus), all of these patients should continue to receive antibiotic prophylaxis with dental and indicated surgical procedures in the years following cardiovascular surgery just as they did prior to surgery.¹ This appears to be especially true for patients with prosthetic heart valves who remain at high risk.²³ There are, however, no conclusive data available to determine the risk of patients to develop endocarditis following repair of most congenital heart defects. Until more data become available these patients probably should be treated postoperatively as they were prior to surgery.¹

Finally there is the third category of conditions for which sufficient data are essentially nonexistent. A few reports mention bacteremia following such diverse procedures as *vaginal delivery*, *bronchoscopy*, *sigmoidoscopy*, even massage of infected carbuncles.²⁷⁻³⁰ There are no well controlled studies to substantiate the necessity for bacterial endocarditis prophylaxis following these procedures even though, as one might expect, occasional cases of bacterial endocarditis have been reported following these types of procedures.^{3,31} Therefore, largely because of the theoretical risk many physicians feel it unwise to neglect antibiotic prophylaxis. Procedures such as *tonsillectomy and adenoidectomy* and surgery of other infected or contaminated tissues are usually included in the list of procedures for which bacterial endocarditis prophylaxis is recommended for cardiac patients at risk.¹

There are other procedures in this category for which one could also construct a strong theoretical case for the necessity for antibiotic prophylaxis to prevent the occurrence of bacterial endocarditis, but even less satisfactory supporting data exist. For example, bacterial endocarditis has been re-

ported to occur in patients with permanent transvenous pacemakers.³² Indeed one recently reported experimental model for producing bacterial endocarditis requires an indwelling polyethylene tube placed transvenously into the heart.³³ Theoretically, then, patients with hydrocephalus requiring indwelling ventriculoatrial shunts would appear to require protection. Several obstetrical gynecological procedures should be mentioned. Although the exact risk of bacteremia following therapeutic abortion has not been carefully studied, mention has been made of endometritis, parametritis and even sepsis following simple aspiration of the uterus.³⁴ Although a less frequently performed procedure, conization of the uterine cervix is another example of a gynecological procedure which, in theory, might require prophylaxis. Very few helpful data regarding these types of procedures are available in the literature. Because of the absence of well controlled studies, clinical practice varies.

Summary

Many questions regarding the necessity of antibiotic prophylaxis to prevent bacterial endocarditis remain unanswered. These questions are more than academic ones! The morbidity and mortality of bacterial endocarditis cannot be accepted lightly. Although it may be difficult to prove, since more debilitated patients are living longer, physicians and dentists may find themselves faced with this problem more frequently than in the past. The lack of available information upon which to base recommendations for many procedures points out a need for carefully controlled prospective studies. Until these data become available, any set of recommendations for prophylaxis can only hope to present the physician with guidelines based upon what is presently known. It would be best to define the requirements for antibiotic prophylaxis with various dental and surgical procedures rather than to simply rely on tradition.

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Postural Screening in an Elementary School

F. PATRICK MALONEY, M.D., M.P.H.* and SHARON HILDEBRANDT, R.P.T.†

POSTURAL PROBLEMS of children are a matter of concern for both professionals and the general public. The Parent-Teachers Association of an Anoka County elementary school evidenced such an interest by their request for postural screening of elementary school pupils. Four physical therapists from Sister Kenny Institute conducted a posture screening of 243 children at the school to assess variations from postural norms. Although this was not undertaken as a formal study, a review of the results provides useful information about the yield of problems that can be expected in a brief screening, the cost of a screening clinic, and the pitfalls that are encountered.

Method

Each child was included on the basis of a written request by a parent. A questionnaire was sent to each of these families and was returned with a request for screening. The questionnaire had two parts: The first requested yes or no answers to a variety of neuromusculoskeletal problems including surgery and prolonged periods of immobilization and chest problems such as heart disease and asthma. Secondly, questions about previous or present needs for orthopedic equipment, braces, or crutches were asked. Explanations were requested for any yes response.

The screening procedure was designed to require less than ten minutes for each child. Body alignment was observed by placing the child behind a see-through grid. The grid had a wooden frame with vertical and horizontal lines of dark thread placed two inches apart in checkerboard fashion. The students were placed in an erect, not relaxed, position behind the grid and toed to markers on the floor for front, back and side determinations.

The grid was used to assist with observations of the alignment and position of the head, spine,

shoulders, scapula, legs, hips, and feet. A checklist of characteristics was used for each child. Specific comments were made regarding forward head, lateral head tilting, kyphosis, lordosis, round back, flat back, hip levels, genu recurvatum, genu valgus, genu varus, foot varus, foot valgus, flattening of the long arch of the foot, tibial torsion, hammer toes, hallux valgus, and scoliosis. Observations of chest deformity or deformity of other bony structures were made. The rib hump sign of spinal rotation was determined by viewing each child from behind throughout flexion at the waist and with the back horizontal. The Trendelenburg test was done on each child.

Each therapist assessed the degree of postural deviations for each characteristic as mild, moderate, or severe. A mild deviation was one which very slightly deviated from the vertical line of gravity in the horizontal and frontal planes. A severe postural deviation was one that was so prominent that it could be observed without the use of the grid. Moderate deviations occupied the range between the two. Any positive rib hump sign was classified as severe. No attempt was made to assess the variability of these assessments between therapists. No photographs, Xrays or measurements were made. Questionnaire data was not validated.

Results were provided to the physician and the parents of each child, as well as to the school. It should be emphasized that diagnoses were not made, but rather, possible problems were identified as a service for the treatment of the child.

Only those children designated moderate and severe were grouped as having problems. Although some variability between therapists exists it is unlikely that the difference is more than one grade of severity. For purpose of parental notification children classified as mild or with a constellation of findings considered mild and those children with no problems were designated as having "no significant variation." Those children with moderate or severe deviations or with lateral or rotational scoliotic-like curves were designated as having "excessive variation." The parents were

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notified to contact their physician for his opinion about the findings and ascertain what form of follow-up might be desirable. The physicians received written appraisals of all problems regardless of the tabulated designation of mild, moderate, or severe.

Results

Sixty-three percent of the school population was screened. Of the 243 children who were screened, 54.3% were boys and 45.7% were girls. Table 1 shows the percentage age distribution and cumulative percent of those screened. There were 61 problems in 44 children judged by the therapists to be more than of "mild variation." Table 2 shows the general categories of problems.

Positive histories of musculoskeletal problems or of chronic illness of any sort were found in 17.55% of normals, 25.0% of those with mild problems, and 34.15% of those with severe problems. A positive history was considered as one in which any of the questions was answered affirmatively. In the majority of cases, there was no association between the positive history specific to the problem ascertained in the screening. Of the 231 who completed the questionnaire, 14 persons had a positive history with positive findings, 27 had a negative history and positive findings, 23 had a positive history and negative findings, and 167 had no history and no findings.

Proportionally, more boys were examined in the 11 to 13 year age group and more girls in the eight year and under group. Even so, problems were found disproportionately more in boys than in girls in the former group.

The cost of screening is itemized in Table 3.

Discussion

Postural deviations are common in the elementary school age group. Parents and professionals in medicine and education are interested in an economical way to ascertain children with potential problems. Many of the postural deviations are of questionable significance, such as lordosis, mild pronation of the feet, and head tilting. It is not known how many of these children will develop significant discomfort in later life, nor is it clear how many with functional curves will actually develop a structural scoliosis. It is known that pelvic asymmetries of one-half inch or more are associated with back pain in young adulthood and the discomfort is relieved by a shoe lift.¹ In

the elementary age group asymmetries can be corrected by a heel lift.²

Several problems can be noted in the process of carrying out screening clinics. The cost is substantial and, considering the yield, appears to be an inefficient use of skilled professionals (Table 3). The travelling costs would be less at a school closer to the screening facility. The cost of screening if therapists are used from an ongoing program, require either patient treatments to be cancelled or a substitute therapist to be obtained which would further increase the cost. The usual problems of reproducibility of findings and the consistency between therapists' examinations are present. No attempt was made for control of this and in view of the discrepancy in findings between the two therapists who examined the boys and the two who examined the girls this would be essential for any future planning.

Substantially more boys had problems than girls, especially in grades four through six. Only 17 girls were examined in the age group of 11 and over while there were 40 boys in this category. Although a difference in the therapists'

TABLE 1
Percentage Age Distribution and Cumulative Age Distribution of Pupils and Their Problems

Age	Percent	Cumulative Percent	Cumulative Percent Of Those with Problems
6 and under	8	8	2.3
7	13	21	4.6
8	24	45	11.3
9	15	60	27.2
10	17	77	56.9
11	15	92	81.8
12 and over	8	100	100.
	100		

TABLE 2
General Categories of Problems Ascertained

Lateral or rotational curves	8
Problems confined to the feet	12
Problems found dealing with legs	5
Other postural problems (lordosis, kyphosis, round shoulders, etc.)	36

TABLE 3
Cost of a Two Day Screening Clinic

Four Therapists' Salaries for Two Days*	\$285.84
Travel Expense†	115.20
Cost of Forms	5.00
Grids	40.00
Preparation and Data Dispersal	130.51
Miscellaneous	10.00
	\$581.55

*The cost of a substitute therapist for SKI treatment not included.

†Cost of lunches and postage not included.

interpretations probably accounts for most of this difference, other factors may be involved. Lateral pelvic asymmetries were found to increase from an incidence of 74.6% in elementary school aged boys to 86.1% in those of junior high school age.³ In the nine-year-old and under group males with problems were not as over represented which would have been expected if clinical interpretation was the only factor. Since boys achieve adult body posture later than girls⁴ the boys may have a wider variation in the normal limits of posture. Secondly, parents may have sent more children with possible problems to be seen. Nothing is known about the posture of the children in the elementary school who were not screened.

The same problems are found in attempts at determining incidence. These have generally used surveys of Xrays or have looked at the spinal Xrays of children who were ascertained after examination for the rib hump sign of spinal rotation.^{5,6} The latter study did not use other physical signs and did not include lateral curves. The incidence of structural scoliotics ascertained in this way by Dr. Ruth Wynne-Davies in 11,000 Edinburgh school pupils is 1.3 per thousand students under eight years of age and 1.8 per thousand of those over eight years.⁶

In the Anoka School, although children eight years of age and under represented 45% of the children examined, this represented only 11.3% of the problems. It would seem that grades one through three could be omitted in any screening program because of this low yield.

More children with a history of neuro musculoskeletal illness or chest disease had postural problems than those without such a history. Even so, positive histories were obtained in 17.55% of ostensibly normal children. Most children with moderate or severe problems and a positive history did not have a history compatible with the problem which was found. Rather it would seem that as a group those with postural difficulties or potential postural difficulties tend to be different in regards to there likelihood of having had a significant chronic illness or period of musculoskeletal impairment. This likelihood was about double that of those with normal screening examinations. The use of a questionnaire did not appear to be of

significant assistance in helping the therapists. In the brief time each had for an examination, the histories were not used and, as noted subsequently, most children with significant problems did not have a positive history for that problem. In addition, such histories are not valid from a diagnostic sense.

It would be more economical for screening to be restricted to the fourth and sixth grades only, with the addition of other selected students. Physical education teachers could be taught to perform such a screening as part of the educational system's offering. An experienced therapist could supervise such a program. Because of the variability in the examinations of therapists, it is even more important that adequate attention be paid to standardizing the physical education instructors in regards to reproducibility of findings of each screener and the reliability of results between screeners.

The actual mechanics of doing this screening along with the written requests from the parents and post screening notification of parents and physicians appears to work fairly well and should be incorporated in any contemplated screening program.

Summary

Four physical therapists conducted a postural screening clinic for 243 elementary school age children. The problems inherent in conducting this were discussed. The cost appears prohibitive for the general use of such screening clinics.

Histories taken from questionnaires were not valuable in assisting the therapists. The yield in problems ascertained in the first three grades is not sufficient to warrant general screening for this group. It was feasible to screen children in an examination of less than ten minutes.

A feasible and economic alternative using physical education instructors under the supervision of a physical therapist was discussed.

Acknowledgment

We wish to acknowledge Mr. H. Eugene Baland, Principal of Lynwood Elementary School; Ann Lindgren, RPT; Gail Dahl, RPT; DeLeres Ullstrom, RPT; and the school nurses Liz Frigstad and Phyllis Haas for their assistance in organizing and carrying out the posture screening sessions.

References 1-6 will be found on page 1078.

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Guidelines for the Performance of Abortions

as adopted by the
Minnesota State Medical Association, May, 1973

Public Education

EDUCATION ABOUT abortion procedures and services is the responsibility of all health agencies and professionals concerned about the care of women. A variety of agencies should assume a leadership role in making the following essential facts known to the public.

1. Abortion should always be a matter of free personal choice and should not be provided under coercion. Information about alternatives to abortion such as maternity homes, adoption, etc., should be made available.
2. Abortion should not be relied upon as a primary means of fertility control. Contraception or sterilization are preferable to abortion as methods of preventing unwanted births.
3. The symptoms and signs of pregnancy should be widely disseminated so that those wishing to terminate a pregnancy may seek assistance at the earliest stage of pregnancy possible; it should be stressed to both doctor and patient that both risks and costs are lower, when abortion is sought early in pregnancy—specifically in the first trimester.
4. The diagnosis of pregnancy should be confirmed prior to abortion through the performance of a physical examination and, if necessary, a laboratory test for pregnancy. At present screening tests for pregnancy which are available over drugstore counters must not be relied on as substitutes for pregnancy tests performed in laboratories. Abortion must be performed by licensed physicians.
5. Information regarding follow-up care and counseling, including specific places or persons to contact for medical services essential to the prevention or discovery of post-abortion complications or emergencies should be provided.
6. Educational literature on abortion should:
 - A. Be readily obtained.
 - B. Stress that abortion is a matter of free choice and should be entered into without coercion and with full knowledge of all available alternatives.
 - C. Specify agencies or individuals who can provide further information, counseling and service.
 - D. Discourage individuals from seeking illegal abortions.

E. Stress the importance of medical follow-up after an abortion.

F. Emphasize the desirability of contraception instead of abortions to avoid unwanted pregnancy. Facts concerning sterilization should also be made available.

G. Physician's fees for abortion should be comparable with his fees for a similar surgical procedure.

H. Physicians should have information about public assistance programs, other insurance coverage, and other abortion facilities.

Referral

Abortion referral services should be available through a variety of sources:

1. Referral should be made only to physicians and facilities which meet the provisions contained in these Guidelines.
2. Before referrals for abortions are made the patient should be seen and examined by a physician to determine whether the patient is pregnant and the estimate of duration of gestation.
3. Medical associations should encourage and assist their memberships in the establishment of appropriate referral relationships. All professional associations should continue to emphasize adherence to traditional ethics.
4. Physicians should be encouraged to establish referral relationships with community counseling, social service agencies and mental health centers.

Counseling Services

Physicians should make counseling services an integral component of their abortion programs. Counseling services should be readily available to all women seeking abortion services. Each abortion service shall provide abortion counseling if desired by the woman, as well as a referral to clergy, social services or other appropriate mental health services when needed. Three basic principles of abortion counseling are that:

1. Specialized professional consultation, such as psychiatric, social service, psychological, religious, etc., should be available, not mandatory.
2. Be supportive and non-judgmental regardless of the circumstances of the pregnancy.
3. That it be an educational experience.

The aims of abortion counseling are:

1. To aid the woman in making a decision about

ABORTION GUIDELINES

her pregnancy.

2. To help her implement the decision.
3. To assist her in controlling her future fertility.

The manner in which counseling is carried out plays a major role in determining whether the woman is protected against exploitation and is treated in a safe, humane, and dignified manner. The following standards are recommended to accomplish this:

1. Non-judgmental and supportive explanation of all alternatives available including social, medical, and financial assistance where available.
2. Counseling should serve, when appropriate, to simplify and expedite the provision of abortion services. It should not impose unnecessary medical risk by delaying the obtaining of these services.
3. Specialized professional consultation, such as psychiatric, social service, psychological, religious, etc., should be available, but not mandatory.
4. Preventive measures including contraception and/or sterilization, with specific plans for followup should be discussed with each woman.

Factors to consider in counseling:

1. Pregnancy termination may be part of the problem, not just the solution. The fact that a woman has become pregnant may be a *symptom of underlying psychological conflicts*. Opportunities should be available for further counseling.
2. Physicians are encouraged to acquire counseling techniques.

Medical Surgical Guidelines

A medical history shall be obtained and a physical examination shall be performed including a pelvic examination.

The following laboratory tests should be performed on every abortion patient:

- Hematocrit or Hemoglobin
- White Blood Count and differential
- Urinalysis
- Rh Typing—specimen retaining in the event of cross-matching tests for transfusion if required and for the possible administering of Rh vaccine.
- Gonorrheal Cultures are recommended
- Papanicolaus Smears are recommended when indicated
- Serological test for syphilis

During the first trimester abortion facilities should have the following available:

- a. laboratory facilities (hemoglobin, Rh, urinalysis, pregnancy testing, Pap smear, VD testing)
- b. blood bank
- c. anesthesia
- d. emergency facilities

- e. transportation to a hospital, if necessary
- f. pathological examination—examination of the contents of the uterus and report to the State Board of Health
- g. family planning information and materials
- h. two week post-abortion examination

During the second trimester abortions should be performed:

- a. under conditions enumerated above
- b. only in a hospital licensed by the state or in an equivalent facility

Termination of pregnancy during the period of viability is justifiable only to save the life of the mother or fetus. Reasonable effort shall be made to deliver a liveborn child. Termination of pregnancy should be performed only under conditions listed above.

A pathological examination by a pathologist should be made of tissues removed during an abortive procedure. Hospital clinics should comply with the prevailing policies of that hospital and the hospital licensure requirements in the handling, examination and disposition of such tissue.

Essential Therapy for Rh Negative Patients— Anti Rh immune globulin therapy should be given to all Rh negative patients within 72 hours of completion of the abortion procedure, when appropriate to the patient's future childbearing potential.

If for any reason a patient refuses such therapy, this refusal should be noted by the physician in the clinical record, and documented and supported by the patient's signature on appropriate release forms to protect the physician and the facility from future liability involving subsequent pregnancy problems.

Facilities

Abortions performed in the first trimester may be done in the following types of facilities:

*Licensed Hospital**

A hospital is an institution licensed by the State Department of Health adequately and properly staffed and equipped: providing services, facilities and beds for the reception and care for a continuous period longer than 12 hours for one or more non-related persons requiring diagnosis, treatment or care for illness, injury or pregnancy; and regularly making available clinical laboratory services, diagnostic x-ray services, and treatment facilities for (a) surgery or (b) obstetrical care or (c) other definitive medical treatment of similar extent. The following are not "hospitals" within these regulations: diagnostic or treatment centers, physicians' offices or clinics, and facilities for the

*Minnesota Statutes and Regulations of the Minnesota State Board of Health for Licensing Maintenance and Operation of Hospitals, 1955.

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foster care of children licensed by the Commissioner of Welfare.

Affiliated Facility Abortion Service

Is a facility organized for the primary purpose of providing abortion service which is located within a total transport time of ten minutes from a licensed hospital with which such service has a written affiliation agreement for the treatment of its patients. Total transport time means the total elapsed time between the diagnosis, at an affiliated abortion service, of a complication requiring emergency care and the transfer of both the patient and the responsibility for the patient's care to appropriate medical personnel at a hospital. It is desirable and recommended that abortion services provided in the offices of a physician or group of physicians should meet these guidelines.

Operating Requirements

Licensed Hospital

Shall meet the requirements of the State Board of Health Regulations previously cited including Section 4231:

Surgical Department

Areas to be Provided. All hospitals providing for the surgical care of patients shall have an operating room or rooms, scrub-up facilities, clean-up facilities and space for the storage of surgical supplies and instruments. The surgical suite shall be located to prevent routine traffic through it to any other part of the hospital.

Operating Room. The operating room shall be of a sufficient size to accommodate the personnel and equipment needed.

Illumination. There shall be satisfactory illumination of the operative field as well as general illumination.

Sterilizing Facilities. Adequate work space, sterilizing space and sterile storage space shall be provided. Sterilizers and autoclaves of the proper type and necessary capacity for the sterilization of utensils, instruments, dressings, water and other solutions shall be provided and maintained in an operating condition. Special precautions shall be taken so that sterile supplies are readily identifiable as such and are completely separated from nonsterile supplies.

Affiliated Facility Abortion Service

Admission and Examination Facilities—for registration, counseling, medical evaluation, examination and referral, equipped with suitable furnishings

and accommodations, including waiting and dressing rooms and other appurtenances for the privacy, physical comfort and convenience of patients and personnel. Sufficient, suitably equipped examining rooms shall be provided for the daily caseload. Nothing contained herein shall prohibit registration, interviewing, history-taking, medical examination and appropriate referral from being conducted in an existing physician's office or medical facility.

Procedure Room—All rooms in which abortions are performed shall be adequately equipped, supplied and staffed and shall include the following in addition to the instruments and equipment needed for the performance of abortions:

(a) Anesthesia equipment and such other equipment as is necessary to treat patients for hemorrhage, shock, cardiac arrest, and other emergencies.

(b) An adequate supply of drugs, plasma expanders and parental fluids immediately available at all times with appropriate refrigeration equipment therefor.

(c) Dressing room and scrub-up facilities which are suitably located.

(d) A utility room with facilities for sterilization of supplies, except in an abortion service which receives sterile supplies from a central supply service.

(e) The operating facilities and equipment shall be constructed and maintained so as to be free from sanitary hazards and safety hazards.

(f) Environmental controls to prevent infection, including the control of personnel and patient traffic, shall be maintained in the operating facilities.

Recovery Room—An adequately sized and separate recovery room or rooms in proximity to the operating facilities shall be provided. The recovery room shall contain adequate suction, oxygen resuscitative, and other related equipment. Such room shall be staffed by qualified nursing personnel. An appropriate number of recovery beds and/or rooms shall be provided to insure an adequate length of recovery time as determined by the physician for the recovery of each patient.

Laboratory Facilities—The affiliation agreement shall include provision for use in the hospital of those facilities required in these guidelines. However, the affiliated abortion service shall have on its premises such facilities as are necessary for clinical tests specified in the agreement. An adequate supply of drugs, plasma expanders and parental fluids shall be available at all times under appropriate storage.

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Elevators—any building of more than one story in height and of which an abortion service is a part should be provided with an elevator for the use of non-ambulatory abortion patients. The elevator shall be of sufficient size to accommodate a standard stretcher.

Transportation—An affiliated abortion service should have immediately available organized transportation capable of insuring that a patient requiring emergency care will be transported to the affiliated hospital within the total transport time of ten minutes. Patients should be accompanied by attending personnel when being transported.

Affiliation Agreement—should make available all hospital facilities and services.

Operative and Post Operative Guidelines

Abortions on patients with a gestation up to and including twelve weeks as determined by the physician may be performed on an ambulatory basis if the patient's medical condition permits.

The following patients shall be treated on an inpatient basis for the abortion:

- A. Patients pregnant more than twelve weeks as determined by the physician;
- B. Patients having medical, surgical, gynecological or psychiatric indications.

Patients should receive the following post-operative care:

- A. Patients whose pregnancy was terminated on an ambulatory basis shall be observed in the abortion service for a reasonable length of time as determined by the physician to ensure that no immediate post-operative complications are present and thereafter such patients may be discharged if their course has been uneventful;
- B. Patients in whom any adverse condition exists or in whom a complication is known or suspected to have occurred during or after the performance of the abortion should be followed carefully in a manner determined by the physician.

Written instructions should be issued to all patients in accordance with the rules of the physician in charge of the abortion service and shall include the following:

- A. Symptoms of complications to be looked for;
- B. Activities to be avoided;
- C. Specific telephone number to be used by the patient should any complication occur or question arise;
- D. Date for follow up visit after the performance of the abortion, which should be scheduled within two weeks.

The patient should receive information on the availability of family planning services when desired. Family planning services should be offered

with the consent of the patient prior to leaving the abortion service.

Accessibility

Abortion services should be as reasonably available to those desiring them as are other surgical procedures.

Quality Control

Establishment of internal quality review mechanisms is strongly encouraged using a team approach including the administrator, physician, registered nurse and counselor. Recommended areas for such evaluation include:

Personnel	Discharge Procedures
Physical Plant	Follow up Procedures
Intake Procedure	Emergency Procedures
Preoperative Management and Procedures	Records
Operative Procedures	Communication with Referring Agency
Recovery Procedures	Financial Practices

Abortion Services Personnel

The following are recommended qualifications and duties for the various personnel involved in the delivery of abortion services and are intended to apply to all such services, regardless of the type of facility in which they are provided. These factors should be considered in obtaining personnel or assigning of staff to an abortion service.

Medical

Medical Director—a physician licensed under Minnesota Law, preferably one who is eligible for or certified by the American Board of Obstetrics and Gynecology. Further, it is recommended that he/she be capable of providing medical supervision of the abortion services in their entirety.

Duties. Establishes, implements and is responsible for written medical policy and standards.

Designates a licensed physician or physicians whom he/she deems qualified to supervise directly the care of all patients undergoing abortion, including their post-operative care and follow-up.

Provides consultation to the staff as necessary.

Physicians—must be licensed under Minnesota Law, and appropriately qualified by training and/or experience to perform abortion services. It is further recommended that the physician hold a staff position in a licensed hospital and has demonstrated competence in the performance of abortion procedures.

Chief Nurse—a currently licensed registered nurse.

Duties

A. Develop, implement and be responsible for

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written nursing policies, standards and services.

B. Supervise and direct the nursing personnel and services.

C. Provide for nursing service at all time.

Other Personnel—Registered nurses, licensed practical nurses, student nurses, practical nurses, attendants and other ancillary personnel assigned to give nursing care in an abortion service shall be adequately trained in observational and emergency techniques for pre-operative and post-operative care of abortion patients and shall be supervised by registered nurses.

Administrative Personnel

Administrator—an administrator may be a non-medical administrator, qualified by education and/or experience. He/she is employed to manage the business and administrative aspects of a free standing abortion service. In hospitals administration services should be provided through the existing Department of Administration.

Duties. (A) Develops and is responsible for implementing all administrative policies. (B) Provides for all necessary support services including reception, admitting, counseling, clerical, house-keeping, accounting, reporting, etc. to assure proper reception and admitting procedures, to maintain required records, compile necessary statistics and execute required reports, as well as to conduct the business functions of the facility in an efficient and adequate manner.

Counselors

Counselors should be knowledgeable by training and/or experience and should be capable of providing the counseling services recommended in these guidelines.

Reporting and Records

Reporting of abortions is essential to planning for, providing, and improving maternal health and family planning services. All confirmed abortions shall be reported. The Minnesota Department of Health will assume the responsibility for collecting abortion reports.

The following records and reports are recommended for inclusion in the abortion reporting system. The facilities' administrators should maintain all such records and reports, and be respon-

sible for conveying them to appropriate agencies. Reports should identify individual patients and physicians in the manner required by the State Board of Health.

1. Reports submitted to the Minnesota Department of Health within fifteen days of the abortion will include:

- Facility Name and Address
- Date of Abortion
- Residence
- Age
- Marital Status
- Education
- Number of previous pregnancies
- Number of living children
- Number of previously induced abortions
- Date last live birth
- Date last normal menses began
- Estimate duration of gestation documented by weight and length
- Medical Condition of Woman and fetus (including indications for abortion)
- Operation procedure
- Sterilization
- Complications

2. **Abortion Service Records**—Each facility shall maintain and ensure the confidentiality of clinical records for each patient admitted to the facility. The clinical record for each patient will include the following:

- A. Personal identification
- B. Date of abortion
- C. Gestational size
- D. Age of woman
- E. Technique of abortion
- F. Number of prior pregnancies
- G. Number of prior deliveries
- H. Number of prior abortions, induced and spontaneous
- I. Consent form
- J. Medical history
- K. Report of physical examination
- L. Report of diagnostic findings
- M. Diagnostic and therapeutic orders
- N. Reports of all medical procedures including weight and length of conceptus and counseling performed
- O. Conclusions
- P. Plans for and results of follow up
- Q. Records of post abortion examinations and treatment
- R. Blood type and Rh
- S. Use of Rh immune globulin when indicated

Minnesota State Medical Association

121st Annual Meeting of the Minnesota State Medical Association will be held in Duluth, May 16 and 17, in the Duluth Arena-Auditorium.

Recommendations[†] on Combination Live Virus Vaccines

American Academy of Pediatrics

Committee on Infectious Diseases

In the September 15, 1971 AAP Newsletter sent to Academy members, the Committee on Infectious Diseases of the American Academy of Pediatrics stated its recommendations on the use of combination live virus vaccines. After a careful review of available data, the committee concluded that:

- "This information indicates that the products are both safe and effective when used as directed."
- The vaccine "...can, therefore, be recommended with the obvious advantages of reduction in the number of injections for any given child and a concomitant decrease in the required visits to a physician's office or clinic."

[†]For complete text of both recommendations see your MSD representative or write to Professional Service Dept., Merck Sharp & Dohme, West Point, Pa. 19486.

United States Public Health Service

Advisory Committee on Immunization Practices

In the April 24, 1971 issue of *Morbidity and Mortality Weekly Report*, the Advisory Committee on Immunization Practices of the United States Public Health Service presented recommendations on the use of combination live virus vaccines. The committee stated that:

- "Data indicate that antibody response to each component of these combination vaccines is comparable with antibody response to the individual vaccines given separately."
- "There is no evidence that adverse reactions to the combination products occur more frequently or are more severe than known reactions to the individual vaccines (see pertinent ACIP recommendations)."
- "The obvious convenience of giving already selected antigens in combined form should encourage consideration of using these products when appropriate."



M-M-R^{*}

(MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE | MSD)

Single-dose vials

M-M-R, given in a single injection, fits easily into your routine immunization program for well babies.

Given at age 12 months, M-M-R provides for vaccination early in life against measles, mumps, and rubella.

MSD suggested immunization schedule for well babies

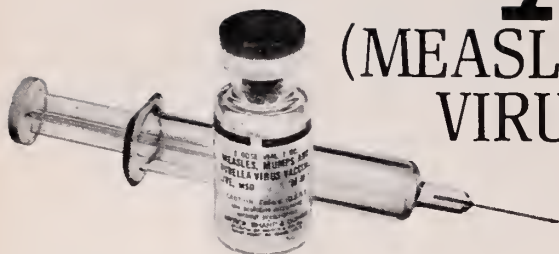
Age	Vaccine(s)
2 months	DPT (diphtheria-pertussis-tetanus) Oral poliomyelitis vaccine (triple)
3 months	DPT ¹
4 months	DPT Oral poliomyelitis vaccine (triple)
6 months	Oral poliomyelitis vaccine (triple)
12 MONTHS	M-M-R (MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE, MSD)

¹This vaccination may be given at 3 months, 5 months, or at 6 months, depending on your preference or on the condition of the child.

Since vaccination with a live virus vaccine may depress the results of a tuberculin test for four weeks or longer, the test and the vaccine should not be given during the same office visit.

^{*}Trademark of Merck & Co., Inc.

For a brief summary of prescribing information, please see following page.



M-M-R

(MEASLES, MUMPS AND RUBELLA VIRUS VACCINE, LIVE | MSD)

Single-dose vials

Contraindications: Pregnancy or possibility of pregnancy within three months following vaccination; infants less than one year old; sensitivity to chicken or duck, chicken or duck eggs or feathers, or neomycin; any febrile respiratory illness or other active febrile infection; active untreated tuberculosis; therapy with ACTH, corticosteroids, irradiation, alkylating agents, or antimetabolites; blood dyscrasias, leukemia, lymphomas of any type, or other malignant neoplasms affecting the bone marrow or lymphatic systems; gamma globulin deficiency, i.e., agammaglobulinemia, hypogammaglobulinemia, and dysgammaglobulinemia.

Precautions: Administer subcutaneously; do not give intravenously. Epinephrine should be available for immediate use should an anaphylactoid reaction occur. Should not be given less than one month before or after immunization with other live virus vaccines, with the exception of monovalent or trivalent poliovirus vaccine, live, oral, which may be administered simultaneously; vaccination should be deferred for at least three months following blood transfusions or administration of more than 0.02 ml immune serum globulin (human) per pound of body weight, or human plasma.

Due caution should be employed in children with a history of febrile convulsions, cerebral injury, or any other condition in which stress due to fever should be avoided. The physician should be alert to the temperature elevation which may occur 5 to 12 days after vaccination.

Excretion of the live attenuated rubella virus from the throat has occurred in the majority of susceptible individuals administered the rubella vaccine. There is no definitive evidence to indicate that such virus is contagious to susceptible persons who are in contact with the vaccinated individuals. Consequently, transmission, while accepted as a theoretical possibility, has not been regarded as a significant risk.

Attenuated live virus measles, mumps, and rubella vaccines, given separately, may temporarily depress tuberculin skin sensitivity; therefore, if a tuberculin test is to be done, it should be scheduled before vaccination, to avoid the possibility of a false negative response.

Before reconstitution, refrigerate vaccine at 2-8 C (35.6-46.4 F) and protect from light. Use only diluent supplied to reconstitute vaccine. If not used immediately, return reconstituted vaccine to refrigerator at 2-8 C (35.6-46.4 F), and discard after eight hours.

Adverse Reactions: To date, clinical evaluation has not revealed any adverse reactions peculiar to the combination. The adverse reactions that occurred were limited to those that have been reported previously for the component vaccines.

Fever, rash; mild local reactions such as erythema, induration, tenderness, regional lymphadenopathy; parotitis; thrombocytopenia and purpura; allergic reactions such as urticaria; arthritis, arthralgia, and polyneuritis.

Occasionally, moderate fever (101-102.9 F); less commonly, high fever (above 103 F); rarely, febrile convulsions.

Encephalitis and other nervous system reactions that have

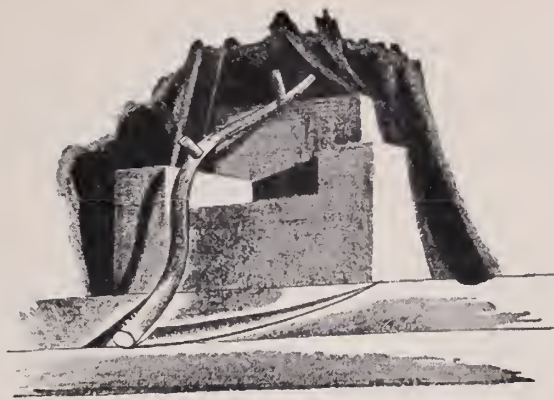
occurred very rarely with the individual vaccines also occur with the combined vaccine. Experience from more than 44 million doses of all live measles vaccines given in the U.S. by mid-1971 indicates that significant central nervous system reactions such as encephalitis occurring within 30 days after vaccination, have been temporally associated with measles vaccine approximately once for every million doses. In no case has been shown that reactions were actually caused by vaccine. The Center for Disease Control has pointed out that "a certain number of cases of encephalitis may be expected to occur in a large childhood population in a defined period of time even when no vaccines are administered. A survey conducted in New Jersey in 1968 showed that 2.8 cases of encephalitis (of unknown cause) occurred per million children, ages 1-9 years, in a 30-day period." However, the Center for Disease Control has analyzed the reported reactions following measles vaccines and pointed out that "the clustering of cases in the period 6 through 13 days after inoculation as well as the recovery of measles virus (probably the vaccine strain) from the CSF of one patient do suggest that some of these cases may have been caused by the vaccine." The risk of such serious neurological disorders following live measles virus vaccine administration remains far less than that for encephalitis with measles (one per thousand reported cases).

Transient arthritis, arthralgia, and polyneuritis are features of natural rubella and vary in frequency and severity with age and sex, being greatest in adult females and least in prepubertal children. Such reactions have been reported with live attenuated rubella virus vaccines. Symptoms relating to joints (pain, swelling, stiffness, etc.) and to peripheral nerves (pain, numbness, tingling, etc.) occurring within approximately two months after immunization should be considered as possibly vaccine related. Symptoms have generally been mild and of no more than three days' duration. The incidence in prepubertal children would appear to be less than 1% for reactions that would interfere with normal activity or necessitate medical attention.

How Supplied: Single-dose vials of lyophilized vaccine containing when reconstituted not less than 1,000 TCID₅₀ (tissue culture infectious doses) of measles virus vaccine, live, attenuated, 5,000 TCID₅₀ of mumps virus vaccine, live, and 1,000 TCID₅₀ of rubella virus vaccine, live, expressed in terms of the assigned titer of the FDA Reference Measles, Mumps, and Rubella Viruses, and approximately 25 mcg neomycin, with a disposable syringe containing diluent and fitted with a 25-gauge, 3/8" needle. Also in boxes of 10 single-dose vials nested in a pop-out tray with a separate box of 10 diluent-containing syringes.

For more detailed information, consult your MSD representative or see full prescribing information. Merck Sharp & Dohme, Division of Merck & Co., Inc., West Point, Pa. 19486.

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In Memoriam

MILTON ABRAMSON, M.D.

Dr. Milton Abramson, 68, Minneapolis obstetrician and gynecologist, died November 5. Born in Floodwood, Minnesota, Dr. Abramson received his medical education from the University of Minnesota Medical School.

He was a member of the American Medical Association, the Minnesota State Medical Association and the Hennepin County Medical Society.

He is survived by his wife, Ruth, daughter, Mrs. Martin Barke, and sons, Dr. Michael Abramson of San Francisco and Dr. Burton Abramson of Hopkins.

CLAUDE C. KENNEDY, M.D.

Dr. Claude C. Kennedy, 88, Minneapolis surgeon, died November 3. He was a graduate of Marquette University Medical School.

On the surgical staffs of both Asbury and Swedish Hospitals for many years, Dr. Kennedy was also a member of the American Medical Association and the Hennepin County Medical Society, and a 50 Club and Life Member of the Minnesota State Medical Association.

In 1966, he was appointed to the staff of the Mayo Clinic, Rochester, as a consultant in internal medicine.

Dr. Kennedy is survived by his daughter, Mrs. Lindsay Booth of Radlands, California.

FRANK H. KRUSEN, M.D.

Dr. Frank H. Krusen, 75, authority on physical medicine and rehabilitation who founded the Mayo Clinic's Department of Physical Medicine and Rehabilitation, died September 16. He retired from the Clinic in 1963 to become a professor at Temple University School of Medicine, Philadelphia. Later he was adviser to the Division of Physical Medicine at Tufts School of Medicine in Boston, until he retired a few years ago.

His education was obtained at Jefferson Medical College in Philadelphia. He served as president of the Sister Kenny Foundation and Director of the Kenny Rehabilitation Institute in Minneapolis from 1960 to 1963 and was a former president of the American Academy of Physical Medicine, and former president of the Minnesota State Board of Health. He held countless honorary degrees from medical universities and societies. The People's People Eisenhower Award was presented to him by resident Nixon.

He is survived by his wife, Margaret, and two daughters, Mrs. Robert Hart and Janice Krusen.

EDWIN G. HUBIN, M.D.

Dr. Hubin, 79, a practicing physician in Sandstone and in northern Pine County for the past 36 years, died September 4.

He was active in his community and in medical circles and was instrumental in the building of the Pine County Memorial Hospital. In addition, he was a member of the American Medical Association, the Minnesota State Medical Association and the East Central Minnesota Medical Society.

Dr. Hubin is survived by his three sons, Allen, Edgar and Wilbert.

VILHELM MANUEL JOHNSON, M.D.

Dr. V. M. Johnson, 59, Dawson physician, accidentally drowned while on a fishing outing, October 3. He had been serving as a member of the Judicial and Insurance Liaison Committees of the Minnesota State Medical Association at the time of his death.

He had served as a Director for Blue Cross and Blue Shield since 1966 and was a charter member of Blue Cross; was affiliated with the American Medical Association, the Minnesota State Medical Association and the Camp Release District Medical Society. In addition he was a Fellow in the American Academy of Family Physicians.

Dr. Johnson is survived by his wife, Margaret, daughter Marsha, and three sons, Kimball, Reed and Todd.

RICHARD N. JONES, M.D.

Dr. Richard N. Jones, 89, St. Cloud surgeon, died September 7. A native of Gomer, Ohio, Dr. Jones received his medical degree from the University of Chicago and Rush Medical College in 1914. After his retirement in 1968, Dr. Jones was active in voluntary service with the Red Cross Blood Bank in St. Cloud.

He was a member of the Stearns-Benton Medical Society, the American Medical Association, the American Academy of General Practice and the American College of Surgeons, and a 50 Club and Life member of the Minnesota State Medical Association.

Dr. Jones is survived by his wife, Marie, daughter, Ellen, and son, Dr. Richard N. Jones, Jr. of Portland.

IN MEMORIAM

JOHN P. McDOWELL, M.D.

Dr. J. P. McDowell, 95, former St. Cloud physician, died September 17. He had practiced medicine in St. Cloud for 57 years and was Stearns County Coroner for eight years.

A 50 Club and Life member of the Minnesota State Medical Association, Dr. McDowell was also a member of the American Medical Association and the Stearns-Benton County Medical Society.

Dr. McDowell is survived by his daughters, Mrs. Lloyd Peters and Mrs. Richard Jones.

WILLIAM A. HANSON, M.D.

Dr. William A. Hanson, 80, a Rochester native and a Minneapolis physician, died September 22. He was closely associated with the University of Minnesota athletics, and co-founder of the University of Minnesota Medical Foundation. His action as a lobbyist was the key to the Minnesota Legislature's support of \$5 million for the Mayo Memorial Building, a part of the University's Medical Centers.

Dr. Hanson was a member of the Minnesota Academy of Medicine, the American Medical Association, the Hennepin County Medical Society and a 50 Club and Life Member of the Minnesota State Medical Association.

He is survived by his wife, Charlotte, a son, William, and a daughter, Mrs. W. Carpenter.

SAMUEL G. BALKIN, M.D.

Dr. Samuel G. Balkin, 67, Minneapolis surgeon, died October 15. He was a former faculty member at the University of Minnesota Medical School, head of Plastic Surgery at Hennepin County General Hospital, past president of the American Society of Maxillofacial Surgery, former chief of staff at Mount Sinai Hospital, and a member of the American Medical Association and the Hennepin County Medical Society. Dr. Balkin was an associate member of the Minnesota State Medical Association.

Born in Minneapolis, Dr. Balkin obtained his medical education at the University of Minnesota.

He is survived by his wife, Florence, two daughters, Mrs. Douglas Preston and Mrs. Donald Kirschner.

MAX E. SCHOTTLER, M.D.

Dr. Max E. Schottler, 70, Minneapolis physician, died October 2. Born in Dexter, Minnesota, his medical education was obtained at the University of Minnesota.

He was a member of the American Medical Association, the Minnesota State Medical Association and the Hennepin County Medical Society.

CHARLES G. UHLEY, M.D.

Dr. Charles Gordon Uhley, 69, formerly with the Northwestern Clinic in Crookston for many years, died August 27. Born in Slayton, he graduated from Macalester College in St. Paul and taught school in South Dakota. After a few years of teaching, he enrolled at the University of Minnesota and graduated from Medical School in 1933.

He was surgeon for the Great Northern Railroad until his retirement and was on the staff of both Bethesda and St. Francis Hospitals in Crookston. Dr. Uhley was

a member of the American Medical Association, the Minnesota State Medical Association, the Red River Valley Medical Society, the American College of Surgeons, the Minnesota Surgical Society and the Twin Cities Urological Society.

His wife, Flossie, survives him.

FRANK G. HEDENSTROM, M.D.

Dr. Frank G. Hedenstrom, 79, St. Paul pediatrician for more than 50 years, died November 3. A Graduate of the University of Minnesota Medical School, Dr. Hedenstrom was a staff member of Bethesda and Children's Hospitals.

He was a member of the American Medical Association and the Ramsey County Medical Society and a 50 Club and Life Member of the Minnesota State Medical Association.

Dr. Hedenstrom is survived by his brother, E. Axel.

DAVID HOWARD ROLIG, M.D.

Dr. D. Howard Rolig, 63, St. Paul physician, died September 7. Born in St. Paul, Dr. Rolig attended the University of Minnesota Medical School.

He was a member of the American Medical Association, the Ramsey County Medical Society and the Minnesota State Medical Association.

He is survived by his wife, Grace, and daughters, Mrs. Sam Olsen, Mrs. Bruce Ivascu, Mrs. Lynn Mortensen and Nancy.

CLARENCE A. STRUNK, M.D.

Dr. Clarence A. Strunk, 74, Minneapolis physician, died September 5. Educated at the University of Minnesota Medical School, Dr. Strunk was a former staff member of St. Andrew's Hospital, Maternity Hospital and Glen Lake Sanatorium.

He was a member of the American Medical Association, the Hennepin County Medical Society and the Minnesota State Medical Association.

Dr. Strunk is survived by his wife, Gertrude.

JOHN JACOB KAPLAN, M.D.

Dr. John Jacob Kaplan, 61, Minneapolis internist, died August 19. A University of Minnesota Medical School graduate, Dr. Kaplan interned at the Hennepin County General Hospital.

He was a member of the American Medical Association, the Minnesota State Medical Association and the Hennepin County Medical Society. He was also a fellow in surgery at the Mayo Clinic.

RAY R. KNIGHT, M.D.

Dr. Ray Roberts Knight, 92, Minneapolis specialist in gastroenterology, died September 14. He was born in Nokomis, Illinois, educated at the University of Minnesota School of Medicine, and interned at Asbury Hospital.

He was a former professor of oral diagnosis, University of Minnesota, a member of the American Roentgen Ray Society, the Radiological Society of North America, the American Medical Association and the Hennepin County Medical Society. Dr. Knight was also a Life and 50 Club Member of the Minnesota State Medical Association.

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Classified advertising rates are thirty (30) cents a word; minimum monthly charge \$7.50; key number, \$1.00 additional.

Replies to advertisements with key numbers should be mailed in care of Minnesota Medicine, 375 Jackson, St. Paul, Minn. 55101.

G.P.s—Golf, swim, water ski, snowmobile, fish, ski minutes away. New 56-bed hospital opening November 1973. Adjacent clinic with room for 8 M.D.s under construction. Join group of 3 young M.D.s or solo. Contact Leland Reichelt, M.D., Davis Clinic, Wadena, Minnesota 56482. Call collect (218) 631-1360 or Earl Schillo, Administrator, Wesley Hospital, Wadena, Minnesota 56482. Collect (218) 631-3510.

INTERNISTS AND GENERALISTS—For growing subsections of 45-man medical department, including allergists, psychiatrists, neurologists, all subspecialties; and expanding primary care section. Multi-specialty group of 120. Large patient population and referral area. Functioning HMO. Generous salary and fringe benefits. Peaceful setting near Wisconsin vacationland and cities. Good schools, cultural advantages, Junior college. Educational and research program. Liberal schedule; little practice pressure. New clinic and hospital planned. Write or call Dr. James L. Struthers, Marshfield Clinic, Marshfield, Wisconsin 54449.

GENERAL PRACTITIONER desired for northern Minnesota clinic located near Lake of the Woods area. Enjoy the clean air, clear waters, compatible working arrangements including ample time off for meetings, vacations and good financial arrangements. Excellently equipped hospital (acute, skilled nursing and board and care facilities.) fine clinic one block from hospital. Write: Minnesota Medicine, 473, 375 Jackson St., St. Paul 55101.

RIVERS EDGE MEDICAL CLINIC—Farmington, Mn. needs two additional General Practitioners to practice in a nearly new Clinic, Hospital and Nursing Home. Fast growing area just 45 minutes from St. Paul-Minneapolis. Metropolitan advantage with Community living. Contact M. H. Hunter, M.D. (612) 463-7181.

EXPANDING TEN MAN FAMILY PRACTICE GROUP in southern Minnesota. Seeks **GENERAL PRACTITIONER OR INTERNIST** for summer of 74. New clinic adjacent to a new 114 bed hospital. Fairmont is a progressive community (City of Five Lakes). Starting salary open, early partnership opportunity. Contact D. E. Grandgenett, Fairmont Medical Clinic. 507-238-4263.

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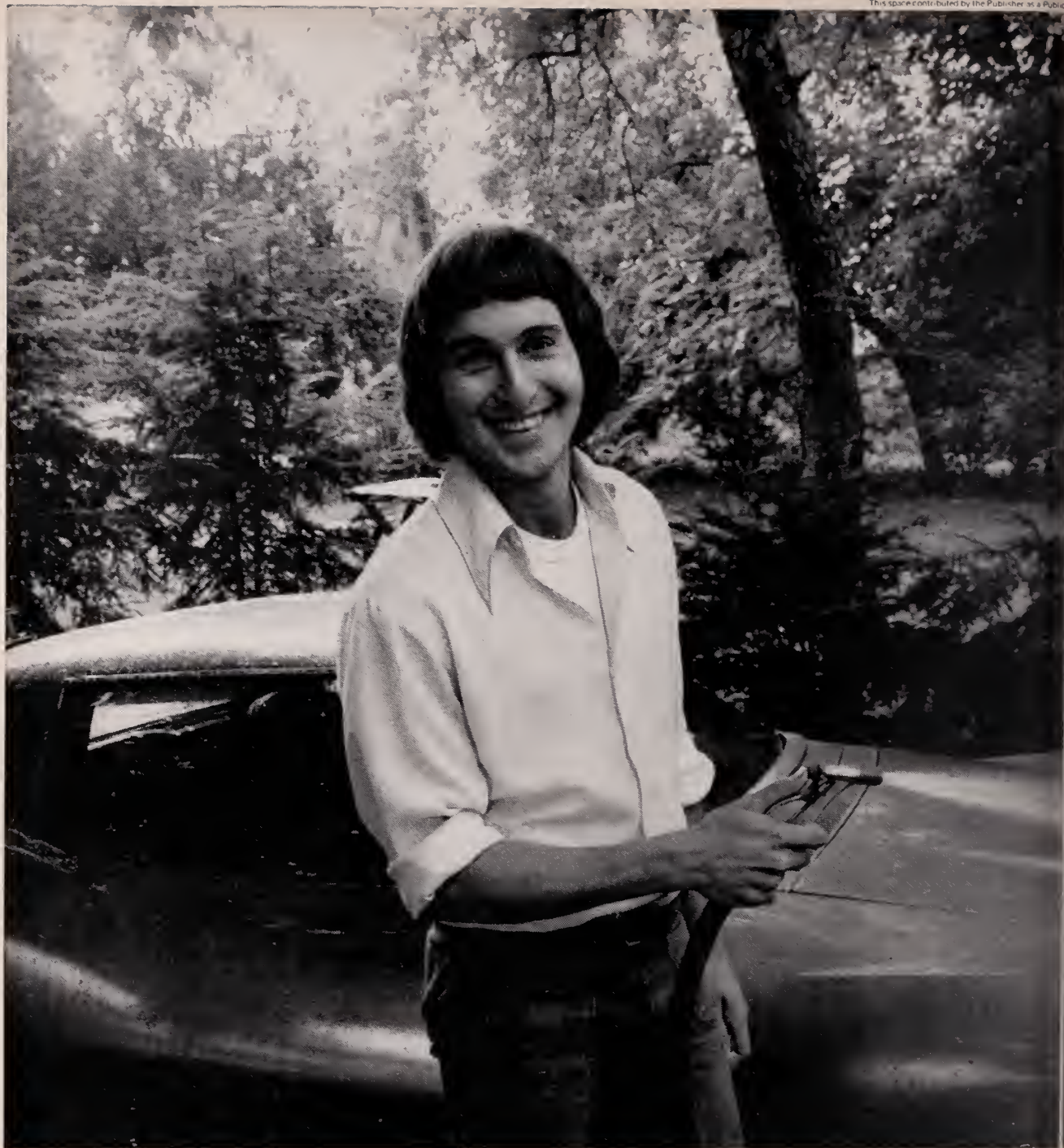
We have grown to fourteen specialties since our building was completed two years ago. We particularly are interested in General Practice, Orthopedics, Psychiatry, Urology, Otolaryngology and Internal Medicine. Give us a call. We have a lot more to show you and to talk about. Reply to: Mr. Paske, Wayzata Medical Building, 250 North Central Avenue, Wayzata, Minn. 55391, (612) 473-0031.

WANTED—General Practitioner to associate with three man group—surgical experience desired. Early partnership. Modern, well-staffed clinic building. Excellent hospital and laboratory facilities. New 50-bed nursing home attached to hospital. Progressive, small agriculture, manufacturing town located in Northwestern Minnesota. Excellent school system. Community Center with enclosed swimming pool, golf course, airport. Please contact R. N. Sather, M.D., Fosston, Minnesota 56542. Telephone 218-435-2345.

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FULL-TIME FACULTY member needed for special outreach teaching program for senior medical students. This is directly connected with the U of Minnesota Medical School and is an academic appointment. Family Physician preferred. Box 214, Mayo Memorial Bldg., University of Minnesota, Minneapolis, MN 55455.

Continued on page 1091



Mike Finamore was told he had leukemia. Nine years ago.

When Mike Finamore was thirteen years old, he was told he had leukemia.

At that time, this meant he had five, maybe six months, to live.

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So Mike was treated. And it worked.

He didn't die.

Instead, he became one of the fortunate few to have leukemia and live. And today his weekly treatments enable him to lead a normal life.

In fact, right now he's putting the roof on a house he built himself.

And when it's finished there will be a double celebration.

The new house. And Mike's 22nd birthday.

Most people expect presents. Mike's happy just to have a birthday.

We want to wipe out cancer in your lifetime. Give to the American Cancer Society.



Classified Advertisements

continued from page 1089

NON-PROFIT NEIGHBORHOOD clinic currently dealing in VD, pregnancy and family planning services requires full-or-part-time medical director by January, 1974. Approved as conscientious objector alternate service. Stipend and benefits open. Contact Jane Berg, Clinic Director, The Family Tree, 1599 Selby, St. Paul 55104, (612) 645-0478.

FULL TIME F.P. urgently needed; small town living; XInt. consultations avail.; opport. for continuing education; accred. hosp.; 1 nite per week plus every fourth weekend. Call Oliver E. H. Larson, M.D., 118 E. 4th St., Zumbrota, Minn. 55992, (507) 732-5119.

INTERNIST-FAMILY PRACTITIONER to join three Family Practitioners and one Board Certified Surgeon in Incorporated group practice. Only 60 minutes north of the Minneapolis-St. Paul area with easy access to lakes and outdoor sports. Facilities include New Clinic, 63 bed general hospital with ICCU and 87 bed nursing home, all new. Call or write: Larry J. Brettingen, M.D., 224 7th St., Mora, Minnesota 55051, Ph. (612) 679-1313.

NOW LEASING for late 1974 occupancy, a new medical building connected to a 275 bed hospital in the rapidly growing Northeast suburb of Minneapolis. Suites will be custom designed to suit individual tenants. For further information, contact J. L. Harty, M.D., c/o Unity Hospital, 550 Osborne Road, Fridley, Minnesota 55432. 612-786-2200.

PHYSICIAN ASSISTANT—27 y/o ex. Navy Corpsman, BS—Biology, will graduate from AMA approved, Class A, PA program. Desires employment with G.P., F.P., or multispecialty clinic. Available 5-1-74. Contact: R. L. Eichelberger, 131 Summer Street, Malden, Mass. 02148 for Curriculum Vitae.

LAKE SHORE—LAKE JOHANNA. Lovely 4 BR and den, all brick, custom built, one owner home for sale. Carpeted and draped Formal DR, 2 all brick fireplaces, 3 season porch with barbecue, 3½ baths. Lovely paneled rec room with wet bar walks out to one acre wooded lot with sandy beach. 2½ car att. garage. Doctors home, close to both St. Paul and Minneapolis. Upper bracket. 866-1722 or CALDIS-ROSCOE REALTORS 926-1803.

PHYSICIAN ASSISTANT Graduate University of Washington MEDEX program. Four years medical experience. Resume upon request. Michael Erkel, 6342 Dellwood Drive, Minneapolis, MN.

WANTED—One or Two F.P. or G.P. for practice in Pine Island, Minnesota. New—two-man medical building. Available immediately. Choice of solo or associate practice. Contact: Gerald Reagan, Tel: 507-356-4529; James Bale 507-356-8343.

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This hilarity, this way of talking and drinking, which seemed to me in the others the mere results of bad company or bad habits, seemed in Marguerite a necessity of forgetting, a fever, a nervous irritability. At every glass of champagne her cheeks would flush with a feverish colour, and a cough, hardly perceptible at the beginning of supper, became at last so violent that she was obliged to lean her head on the back of her chair and hold her chest in her hands every time she coughed.

I suffered at the thought of the injury to so frail a constitution which must come from daily excesses like this. At length, something which I had feared and foreseen happened. Toward the end of the supper Marguerite was seized by a more violent fit of coughing than any she had had while I was there. It seemed as if her chest were being torn in two. The poor girl turned crimson, closed her eyes under the pain, and put her napkin to her lips. It was stained with a drop of blood.*

*Alexandre Dumas fils: *The Lady of the Camelias*, 1848, Chapter 9.

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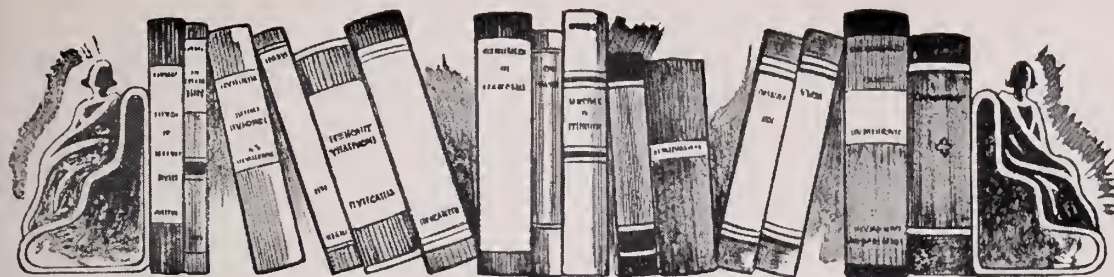
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Book Reviews

DR. THOMPSON'S NEW WAY FOR YOU TO CURE YOUR ACHING BACK—Jess Stearn. Doubleday & Company. \$7.95.

The book is written by a layman, Jess Stearn, based on his own experience under treatment for a back condition by Dr. Thompson as well as other anecdotal material which he obtained from a variety of sources. The book is written for laymen. Most of the supportive material for the exercise treatment advocated is anecdotal in nature rather than scientific. Theoretical basis for the presumed satisfactory results leave much to be desired from a scientific standpoint and would be difficult for a physician and scientist to accept. The author suggests that exercises and changes in the spine can improve a number of conditions, including sinusitis. The exercises themselves seem reasonable for a person without serious spinal disease probably with no danger. The primary exercise which is presumed to cure "displacement of the sacro-iliac joints" is a rather simple one.

In general, my appraisal of the book is that it greatly oversimplifies complex back problems and offers a very simplistic therapeutic approach to back disorders. It also implies that treatment of the back can cure a number of non-skeletal, non-back related conditions which from a scientific standpoint are very difficult to accept.

Alvin L. Schultz, M.D.
Hennepin County General Hospital

HERITABLE DISORDERS OF CONNECTIVE TISSUE, Victor A. McKusick, M.D., 4th Edition, 878 pages, with 1099 illustrations and 2 color plates, The C. V. Mosby Company, \$32.50.

This book represents an exhaustive and meticulous study. It lists more than 114 pages of references. The book has chapters on such heritable disorders as the Marfan syndrome, Homocystinuria, the Weill-Marchesani syndrome, the Ehlers-Danlos syndrome, Cutis laxa, Osteogenesis imperfecta, Alkaptonuria, Pseudoxanthoma elasticum, the mucopolysaccharidoses and a chapter on genetic disorders of the osseous skeleton. The author makes a fine point that 'heritable disorders of connective tissue are not congenital malformations in the conventional sense.' He includes a comprehensive synopsis on page 860 of the more common heritable disorders. The book is addressed primarily to the family physician, the internist and the pediatrician. But it is also a useful reference for the other disciplines. The plastic surgeon may wish to refer to the chapter on Cutis laxa, and the cardiac surgeon to the Marfan syndrome. The rheuma-

tologist may look for new insights as to cause of degenerative connective tissue disease. Hopefully knowledge of the physiochemical details of the collagen molecule may soon match that of hemoglobin molecule. This book is recommended as a reference for clinical practice, investigation and research.

S. F. Ceplecha, M.D.
Redwood Falls, Minnesota

IS MY BABY ALL RIGHT?—Virginia Apgar, M.D., M.P.H. and Joan Beck, 1972, Trident Press, New York 492 pp., \$9.95.

When she was professor of anesthesiology at New York's Columbia-Presbyterian Medical Center, Dr. Virginia Apgar devised her system of scoring the newborn infant. Currently the apgar score is used almost universally throughout the world in delivery rooms. Dr. Apgar is now with the National Foundation, March of Dimes, where she directs the medical program on birth defects.

Joan Beck is a journalist and child-care columnist who collaborated with Dr. Apgar and produced this excellent volume on birth defects.

The first portion of the book describes basic reproductive biology, early embryology, pregnancy and delivery. Then follows a short discussion of general chromosomal defects and obstetrical complications.

The next 300 pages are comprised of 25 chapters each devoted to discussion of a common birth defect, e.g. cleft lip, cystic fibrosis, cerebral palsy, etc.

The last two chapters give practical suggestions to parents on ways to try to prevent birth defects and how to get genetic counseling.

The style is clear and direct with case histories woven into the discussions to heighten reader interest. Lay terms are used as much as possible, but the text is sufficiently technical so that much of the general population would have some trouble understanding portions of this book.

The promotional material on the dust jacket touts this as a volume for all prospective parents. I can think of many other books better suited to that purpose. I would recommend this book for parents of children with birth defects, people with family histories of genetic defects, and professionals such as nurses and therapists who work with these patients. I also recommend it for physicians who want an easy reading less technical review of birth defects.

Richard P. Bendel, M.D.
Associate Professor Ob-Gyn
University of Minnesota Medical School



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Kuhlmann, V. G. (8th)	Alexandria
Jeronimus, Henry J., Jr. (9th)	Duluth

NON-SCIENTIFIC COMMITTEES

RESIDENTS, INTERNS AND MEDICAL STUDENTS

Wellman, W. E. (Chairman)	Rochester
Ahmann, David	Rochester
Andreini, Paul H.	Rochester
Asp, Donald	St. Paul
Ballantine, J. J.	St. Cloud
Blomberg, Robert D.	Minneapolis
Cavert, H. Mead	Minneapolis
Duane, Drake	Rochester
Frost, John	St. Paul
Hakanson, Erick	St. Paul
Halvorson, James	Zumbrota
Kane, Dennis	Minneapolis
Larson, Donald M.	Duluth
Lewis, F. Bruce	Minneapolis
Lindell, Robert	St. Paul
Mankey, James	Minneapolis
McCarthy, Donald	Minneapolis
Nichols, Victoria	Rochester
Raile, Richard B.	Minneapolis
Reick, Robert R.	Rochester
Reif, Robert	St. Paul
Streitz, John M.	Duluth
Tiede, James	Willmar
Windschitl, Harold E.	St. Cloud

RURAL MEDICAL SERVICE

Berg, A. M. (Chairman)	Thief River Fall
<i>Councilor District</i>	
Gjerde, W. P. (1st)	Lake Cit
Odland, Donald M. (2nd)	Luvern
Brace, Ray I. (3rd)	Willma
Lehrer, A. J. (4th)	Montgomer
Stratte, A. K. (5th)	Pine Cit
Yelle, Matthew D. (6th)	Anok
Seifert, Donald R. (7th)	Little Fall
Berg, A. M. (8th)	Thief River Fall
French, Bayard (9th)	Hibbin
Grant, J. C.	Sauk Centr
Harrison, William C.	Minneapolis
Hunt, Vincent	St. Pat
McCollister, Robert J.	Minneapolis
Nielsen, David J.	Minneapolis
Ringhofer, Lawrence	New Ulr
Sauer, Robert	Presto
Verby, John, Jr.	Minneapolis

SCHOLARSHIP & LOANS

Bartholomew, L. G. (Chairman)	Rocheste
Alden, John F.	St. Pat
Christensen, Robert	Rocheste
Christenson, Carl E.	New Brighto
Engwall, Richard	Minnetonk
Fritsche, T. R.	New Ulr
Puumala, R. H.	Cloque
Rutledge, John B.	Detroit Lake
Sheppard, C. G.	St. Pete
Spencer, B. J.	Minneapolis
Verby, John, Jr.	Minneapolis

Councilor Districts

FIRST DISTRICT

J. R. Diessner, M.D.Rochester
Counties—Dodge, Fillmore, Goodhue, Houston,
Mower, Olmsted, Rice, Steele, Wabasha, Winona.

SECOND DISTRICT

Clark P. Virnig, M.D.Wells
Counties—Cottonwood, Faribault, Freeborn, Jackson,
Martin, Murray, Nobles, Pipestone, Rock, Watonwan.

THIRD DISTRICT

Williams A. Owens, M.D.Montevideo
Counties—Big Stone, Chippewa, Kandiyohi, Lac Qui
Parle, Lincoln, Lyon, Meeker, Pope, Redwood, Ren-
ville, Stevens, Swift, Traverse, Yellow Medicine.

FOURTH DISTRICT

Wallace E. Mathews, M.D.Mankato
Counties—Blue Earth, Brown, Carver, Le Sueur, Mc-
Leod, Nicollet, Scott, Sibley, Waseca.

FIFTH DISTRICT

C. J. McCarthy, M.D.St. Paul
Counties—Chisago, Dakota, Isanti, Kanabec, Mille
Lacs, Pine, Ramsey, Sherburne, Washington.

SIXTH DISTRICT

Richard Frey, M.D.Minneapolis
Counties—Anoka, Hennepin, Wright.

SEVENTH DISTRICT

Florian H. Baumgartner, M.D.Albany
Counties—Aitkin, Beltrami, Benton, Cass, Clearwater,
Crow Wing, Hubbard, Lake of the Woods, Morrison,
Stearns, Todd, Wadena.

EIGHTH DISTRICT

L. F. Wasson, M.D.Alexandria
Counties—Becker, Clay, Douglas, Grant, Kittson, Mah-
nomen, Marshall, Norman, Otter Tail, Pennington,
Polk, Red Lake, Roseau, Wilkin.

NINTH DISTRICT

R. O. Bergan, M.D.Duluth
Counties—Carlton, Cook, Itasca, Koochiching, Lake,
St. Louis.

COUNTY MEDICAL ADVISORY COMMITTEES To County Welfare Boards

AITKIN COUNTY

Richard E. BurmanAitkin
F. C. ClosuitAitkin

ANOKA COUNTY

R. J. SpurzemAnoka

BECKER COUNTY

E. S. LorentzenDetroit Lakes
A. S. MidthuneLake Park

BELTRAMI COUNTY

Howard C. ReidBemidji
Wesley SondrealBemidji
Earl GregoireBemidji

BIG STONE COUNTY

Jacob F. KarnOrtonville
Russell PopoffGraceville

BLUE EARTH COUNTY

Wallace E. MathewsMankato
B. Niles BatdorfMankato
Paul M. ArnesenMankato

BROWN COUNTY

Milton KaiserNew Ulm
L. RinghoferNew Ulm
D. E. WohlrabeSpringfield
Theodore FritscheNew Ulm

CARLTON COUNTY

R. H. PuumalaCloquet
Alvan Sach-RowitzMoose Lake

CARVER COUNTY

R. D. PistulkaChaska

CASS COUNTY

C. R. PelzlPine River
Carl H. CoombsCass Lake

CHIPPEWA COUNTY

H. A. RoustMontevideo
T. G. BirkeyMontevideo

CHISAGO COUNTY

G. W. HovdeChisago City

CLAY COUNTY

P. A. CollitonMoorhead
V. J. CarlsonMoorhead

CLEARWATER COUNTY

L. J. LarsonBagley

COOK COUNTY

Roger R. MacDonaldGrand Marais
Wallace R. SmithGrand Marais

COTTONWOOD COUNTY

H. C. StratteWind
J. H. DokkenWind
J. V. CarlsonWestbro

CROW WING COUNTY

Albertus DodsonBrain
J. B. NixonCro
Robert PoppieBrain

DAKOTA COUNTY

James L. CanineSo. St. P

DODGE COUNTY

D. E. AffeldtKas
Grant E. OlsonWest Conco

DOUGLAS COUNTY

E. J. Tanquist, Sr.Alexand
Peter M. GeiserAlexand
J. H. CainAlexand

FARIBAULT COUNTY

John W. AndersonBlue Ea
J. A. WatkinsW
R. S. ArmstrongWinneb

FILLMORE COUNTY

J. E. WestrupLanesb

FREEBORN COUNTY

G. A. ColeAlbert
T. M. GillAlbert
Charles PogueAlbert
L. W. BarrAlbert

GOODHUE COUNTY

G. F. HartnagelRed Wg
G. M. B. HawleyRed Wg

GRANT COUNTY

V. A. DomsElbow L

HENNEPIN COUNTY

Malcolm D. McCampbellMinneap
Shin TanakaMinneap
Markle KarlenMinneap
Edward P. DonatelleMinneap
Sheldon M. LagaardMinneap

HOUSTON COUNTY

Hildegard J. VirnigCaledo
Philip UtzLaCrosse, I
L. A. KnutsonSpring Gre

HUBBARD COUNTY

Howard MortensonMena
Edgar R. GammPark Ra

ISANTI COUNTY

R. C. MagnusonCambr

COUNTY MEDICAL ADVISORY COMMITTEES

ITASCA COUNTY

Keith H. StolenGrand Rapids
 Laurel KargesGrand Rapids
 Donald MuellerGrand Rapids

JACKSON COUNTY

W. W. DomanLakefield
 L. A. ChristiansenJackson
 V. B. WellsJackson

KANABEC COUNTY

C. BursethMora

KANDIYOHI COUNTY

Phillip IverslieWillmar
 John DockseyWillmar
 Jack GuyNew London

KITTSOON COUNTY

Olaf LarterHallock

KOOCHICHING COUNTY

George M. CrowInternational Falls
 Frederick H. WalterInternational Falls

LAC QUI PARLE COUNTY

Hester A. AndersonMadison
 M. JohnsonDawson

LAKE COUNTY

E. ChurchTwo Harbors
 Donald HaaseSilver Bay

LAKE-OF-THE-WOODS COUNTY

Ellen G. JaneckyBaudette

LE SUEUR COUNTY

E. AndersonLe Sueur

LINCOLN COUNTY

Roy MuellerHendricks
 Percy JohnsonTyler

LYON COUNTY

A. PetersonMarshall
 M. OdlandMarshall

MAHNOMEN COUNTY

Charles B. MercilMahnomen

MARSHALL COUNTY

PumalaWarren

MARTIN COUNTY

George N. KraemerFairmont
 A. WilliamsonFairmont

MCLEOD COUNTY

Mark TruesdaleGlencoe
 Robert HegrenesHutchinson
 John J. SmythLester Prairie

MEEKER COUNTY

Frederick S. SchnellLitchfield
 OlsonLitchfield
 Joseph C. HoutsDassel

MILLE LACS COUNTY

B. MetcalfPrinceton

MORRISON COUNTY

W. WatsonLittle Falls
 Elo HansenLittle Falls
 J. SteinPierz

MOWER COUNTY

Harold J. AndersonAustin
 T. M. SceryAustin
 H. MillerAustin
 Clifford PesonenAustin

MURRAY COUNTY

R. F. PiersonSlayton
 J. L. BaderSlayton
 H. D. PattersonSlayton
 Dean NywallSlayton

NICOLLET COUNTY

Vern OlmansonSt. Peter
 C. WohlrabeNo. Mankato
 Melvin LenanderSt. Peter
 George EngstromSt. Peter

NOBLES COUNTY

M. W. PluckerWorthington
 B. C. FaulWorthington
 L. C. StroughWorthington

NORMAN COUNTY

B. KinkadeAda

OLMSTED

Stephen D. MillsRochester
 James R. DoyleRochester
 Theodore O. WellnerRochester
 Deloran L. ThurberRochester
 William A. GiffordRochester
 Terrence R. SteinerRochester
 David R. SandersonRochester

OTTER TAIL COUNTY

Roy NelsonFergus Falls
 Homer CarlsonPelican Rapids
 C. W. LewisHenning
 L. SyversonFergus Falls

PENNINGTON COUNTY

George MartinThief River Falls

PINE COUNTY

F. M. MachPine City

PIPESTONE COUNTY

Jack W. StrandJasper
 J. G. LohmannPipestone
 Roland BeckeringEdgerton

POLK COUNTY

Howard WikoffCrookston

POPE COUNTY

Gordon E. LeeGlenwood
 Berton A. KolpGlenwood
 Foster D. BucherStarbuck

RAMSEY COUNTY

Eugene E. ScottSt. Paul
 John FrostSt. Paul
 Felix Gudion, Jr.St. Paul
 G. E. SchaffhausenSt. Paul
 Charles McCaffertySt. Paul
 Elmer C. PaulsonSt. Paul
 Charles J. MishekSt. Paul
 Wilfred A. CassellSt. Paul
 Lawrence J. SwansonW. St. Paul
 Fred B. WilsonSt. Paul
 Howard ShearSt. Paul
 Robert PowersSt. Paul

COUNTY MEDICAL ADVISORY COMMITTEES

RED LAKE COUNTY

David MersyRed Lake Falls

REDWOOD COUNTY

James B. FlinnRedwood Falls
G. W. KaminskiRedwood Falls
G. E. NelsonRedwood Falls

RENVILLE COUNTY

C. A. AndersonHector
Leo FurrBird Island

RICE COUNTY

Roy H. GoodNorthfield
Asa GrahamFaribault
Burton A. OrrFaribault
J. Gordon BeatonNorthfield

ROCK COUNTY

Darrel SiebertLuverne
F. W. BofenkampLuverne
D. M. OdlandLuverne

ROSEAU COUNTY

Jack DelmoreRoseau

ST. LOUIS COUNTY

W. J. BrookerDuluth
C. D. EklundDuluth
W. H. GrohsDuluth
G. E. HoltDuluth
A. J. JacklinDuluth
H. H. ReedDuluth
Bayard T. FrenchHibbing
Raymond MartinsonVirginia
Gordon GreeneHibbing
Robert NelimarkVirginia
Paul AlexanderHibbing
Wendell EngelstadVirginia

SCOTT COUNTY

P. J. AdamsShakopee

SHERBURNE COUNTY

G. H. TeschElk River

SIBLEY COUNTY

A. F. DysterheftGaylord
John M. VenerArlington

STEARNS-BENTON COUNTY

G. K. KvistbergSt. Cloud
C. D. StilesFoley
R. J. SalkAlbany
L. StahnSt. Cloud
B. L. JohnSt. Cloud
J. J. BallantineSt. Cloud

STEELE COUNTY

A. J. FloerschOwatonna
T. W. StranskyOwatonna
R. W. deWerdOwatonna

STEVENS COUNTY

R. A. RossbergMorri
O. A. EideHancoc
Robert WatsonMorri

SWIFT COUNTY

Edward KaufmanApplet
N. WagnerBenso
T. S. EberleyBenso

TODD COUNTY

David HowardLong Prairi
William MennisStaple
Tim SchmidtBrowervill

TRAVERSE COUNTY

James R. PooleWheat
Joseph PettkoWheat

WABASHA COUNTY

B. J. BouquetWabash
R. N. BowersLake Cit
William P. GjerdeLake Cit

WADENA COUNTY

Leland ReicheltWaden
W. E. ParkerSebek
W. B. HalmeWaden

WASECA COUNTY

Patrick HergottWasec
S. T. NormannWasec

WASHINGTON COUNTY

G. T. MidboeForest Lak
Paul W. NerothinForest Lak

WATONWAN COUNTY

R. A. ParsonsSt. Jame
Herbert BoysenMadeli

WILKIN COUNTY

L. O'BrienBreckenridg
C. W. JacobsonBreckenridg
Neil KippenBreckenridg

WINONA COUNTY

Herbert R. HeiseWinon
Robert B. TweedyWinon
Henry J. RoemerWinon

WRIGHT COUNTY

R. SandeenBuffal
Rok ShinHoward Lak

YELLOW MEDICINE COUNTY

C. L. LundellGranite Fall
Darrell CarterGranite Fall

Woman's Auxiliary to the Minnesota State Medical Association

Officers

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Mrs. James Tetlie.....	President-elect	Duluth
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Mrs. John Beuning	Recording Secretary	St. Cloud
Mrs. Winston Lindberg	Corresponding Secretary	Wayzata
Mrs. Gerald Larson	Treasurer	Cambridge
Mrs. John W. Johnson	Auditor	Minneapolis
Mrs. T. B. Merner	Historian	Faribault
L. L. Bissinger	Parliamentarian	Brainerd

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Mrs. E. C. Menefee	Second District	Albert Lea
Mrs. Carl Lundell.....	Third District	Granite Falls
Mrs. Theodore Fritsche	Fourth District	New Ulm
Mrs. John Brainard	Fifth District	St. Paul
Mrs. Conrad Holmberg	Sixth District	Excelsior
Mrs. L. L. Bissinger	Seventh District	Brainerd
Mrs. Mehdi Orandi	Eighth District	Fergus Falls
Mrs. William Goodnow	Ninth District	Duluth

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CHAIRMEN OF STANDING COMMITTEES

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Publications—Mrs. Clarence Rowe	St. Paul
By-Laws—Mrs. L. L. Bissinger	Brainerd
Finance—Mrs. Cyril R. Tifft	St. Paul
In Memoriam—Mrs. Siegfried Oeljen	Waseca
Resolutions—Mrs. Richard Tucker	Edina

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Health Manpower—Mrs. Arthur Sethre	North Oaks
International Health Activities— Mrs. Gene Muchow	Austin

Legislation—

Mrs. David B. Auran	St. Paul
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MINNPAC Liaison—

Mrs. David B. Auran	St. Paul
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WA/SAMA Liaison:

University of Minnesota— Mrs. George Schaffhausen	North Oaks
University of Minnesota— Mrs. Robert E. Carter	Duluth

Community Health Education—

Mrs. W. G. Halverson	Madelia
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Community Health Services—

Mrs. A. W. Diessner	Afton
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1974 Convention Chairmen:

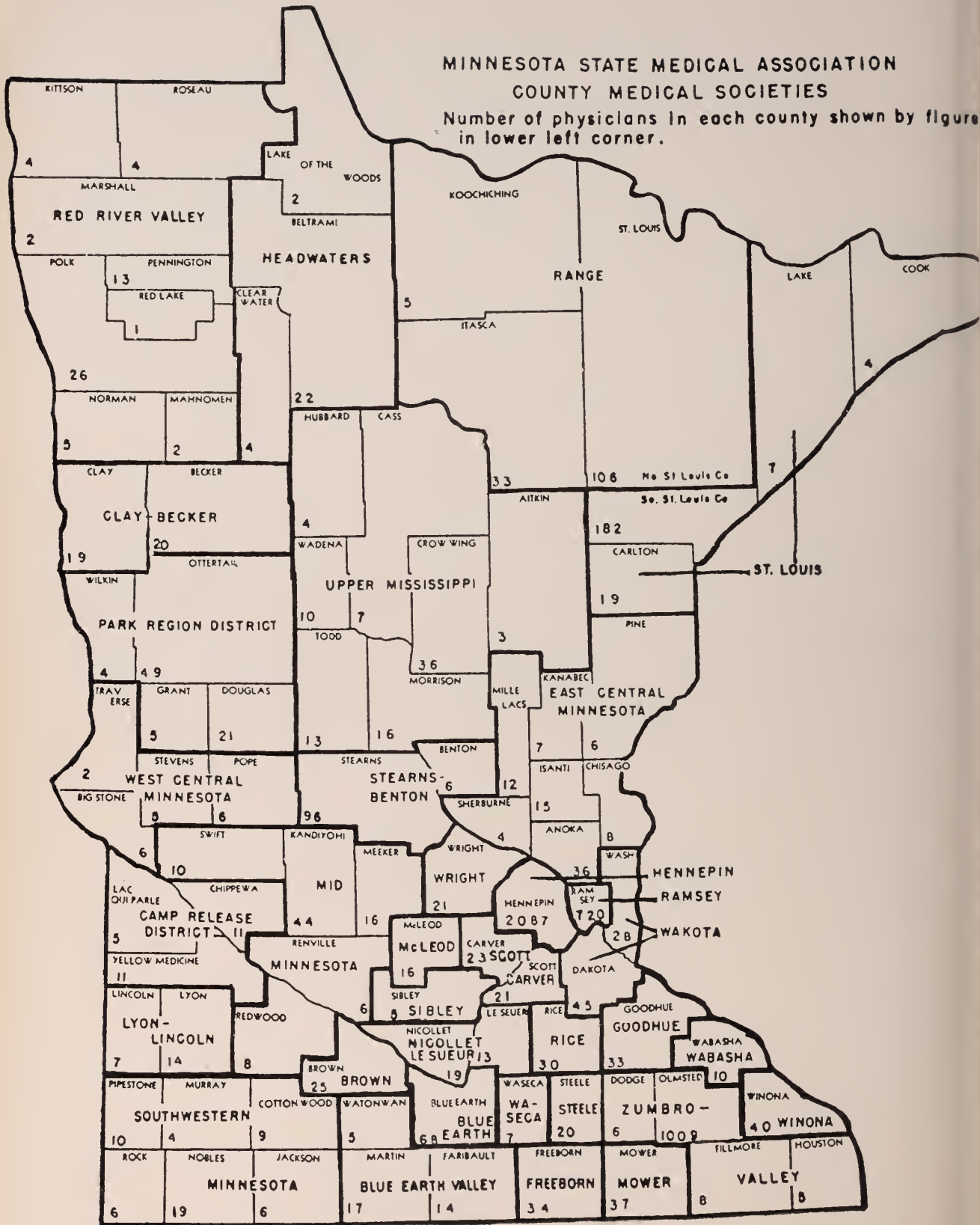
Mrs. Roy R. Juntunen	Duluth
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Advisory Committee—

Mrs. E. S. Boone	Luverne
Mrs. Howard A. Andersen	Rochester
Mrs. Cyril R. Tifft	St. Paul
Mrs. Josiah Fuller	Duluth
Mrs. W. A. Merritt	Rochester
Mrs. F. G. Gunlaugson	Minneapolis

MINNESOTA STATE MEDICAL ASSOCIATION COUNTY MEDICAL SOCIETIES

Number of physicians in each county shown by figure in lower left corner.



County Medical Society Roster

KEY TO SYMBOLS AS FOLLOWS

- * Deceased
- † Associate or Life
- £ Resident or Intern
- § Medical Student
- # Service
- ¶ Affiliate or Honorary
- ‡ Wife is Member of Women's Auxiliary

BLUE EARTH COUNTY MEDICAL SOCIETY

Blue Earth County

Regular meetings, last Monday of the month

Annual meeting, December

Number of members 66

PRESIDENT

Marso, JohnMankato

SECRETARY

Lippmann, Elmer W., Jr.Mankato

‡ Anderson, Oscar D.Mankato
 ‡ Arnesen, Paul M.Mankato
 ‡ Barbarisi, Charles F.Mankato
 ‡ Batdorf, B. N.Mankato
 ‡ Brady, Charles H., Jr.Mankato
 ‡ Butzer, John A.Mankato
 ‡ Cadbury, Jane B.Mankato
 ‡ Chalgren, William S.Mankato
 ‡ Conley, Robert H.Mankato
 ‡ Dobson, Mervin W.Mankato
 ‡ Dover, James W.Mankato
 ‡ Eckert, Joseph F.Mankato
 ‡ Eggert, Delmer C.Mankato
 ‡ Eisenbeis, C. F.Mankato
 ‡ Elliott, J. W.Mankato
 ‡ Eustermann, John J.Mankato
 ‡ Florine, Martin C.Madison Lake
 ‡ Fortier, R. G.Mankato
 ‡ Franchere, Frederick W.Lake Crystal
 ‡ Freeman, Donald H.Mankato
 ‡ Franckowiak, J. L.Mankato
 ‡ Geurs, Benjamin R.Mankato
 ‡ Gislason, Paul H.Mankato
 ‡ Grande, David W.Mankato
 ‡ Hammar, Lawrence M.Mankato
 ‡ Hankerson, Robert G.Mankato
 ‡ Heimark, John J.Mankato
 ‡ Heller, Edgar E.Mankato
 ‡ Hoeper, Philip G.Chesnut Hill, MA
 ‡ Huffington, Herb L.Waterville

† Huffington, Herbert L.Brownsville, Texas
 ‡‡ Jones, Orville H.Mankato
 ‡ Kearney, R. WynnMankato
 ‡ Kemp, Alphonse F.Mankato
 ‡ Knowles, William D.Mankato
 ‡ Lester, John W.Mapleton
 ‡ Lindblom, Alton E.Mankato
 ‡ Lippmann, Elmer W., Jr.Mankato
 ‡ Lund, J. BenjaminMankato
 ‡ McBride, Alexander M.Mankato
 ‡ McGregor, Byron C.Mankato
 ‡ Marso, John L.Mankato
 ‡ Mathews, Wallace E.Mankato
 ‡ Meredith, Donald C.Mankato
 ‡ Mickelson, John C.Los Angeles, CA
 ‡ Morgan, Hugh O.Amboy
 ‡ Norris, J. C.Mankato
 ‡ O'Byrne, AlvaroMankato
 ‡ Ohrt, D. K.Mankato
 ‡ Penn, George E.Mankato
 ‡ Roth, Frederick D.Mankato
 ‡ Rozeboom, Paul E.Mankato
 ‡ Sanford, Raymond A.Mankato
 ‡ Scheidel, Alois M.Mankato
 ‡ Schmitz, Anthony A.Mankato
 ‡ Setzer, Hobert J., Jr.Mankato
 ‡ Stillwell, Walter C.Mankato
 ‡ Sjoding, J. DonaldMankato
 ‡ Smith, Harry J.Lake Crystal
 ‡ Snider, Howard R.Mankato
 ‡ Strobel, C. J. A.Mankato
 ‡ Swenson, Donald B.Mankato
 ‡ Thiem, Chester E.Mankato
 ‡ Vezina, John C.Mapleton
 ‡ Von Drasek, JosephMankato
 ‡‡ Wentworth, Albert J.Mankato

COUNTY MEDICAL SOCIETY ROSTER

BLUE EARTH VALLEY MEDICAL SOCIETY Martin, Watonwan and Faribault Counties Regular meetings, third Wednesday of each month Annual meeting in November Number of members 42

PRESIDENT		‡	Mijares, Wilfredo	Fairmont
Pitcher, Arlo L.		†	Mills, John L.	Winnebago
SECRETARY		§	Molitar, Mike	Madelia
Boysen, Herbert		‡	Moulton, Keith B.	St. James
§ Adolphson, John D.		‡	Nickerson, Neil D.	Fairmont
‡ Anderson, John W.		‡	Parsons, R. A.	St. James
‡ Armstrong, Ralph S.		‡	Parsons, Ralph L.	Trimont
‡ Bellomo, John		‡	Pitcher, Arlo L.	St. James
†‡ Boysen, Herbert		†‡	Russ, Homer H.	Blue Earth
Cox, Russell L.		‡	Schotzko, John R.	Blue Earth
‡ Cullen, Robert M.		§	Schotzko, Charles P.	Blue Earth
Drexler, George W.		‡	Schulz, Robert W.	Fairmont
‡ Feigal, William M.		‡	Sears, Martin F.	Fairmont
‡ Gardner, Jack K.		‡	Tempel, J. W.	Blue Earth
Halverson, D. E.		‡	Thayer, Ellsworth A.	Fairmont
‡ Halverson, William G.		‡	Venugopal, M.	Blue Earth
‡ Hanson, Lewis		‡	Virnig, Mark P.	Wellington
‡ Holstine, John D.		‡	Virnig, Richard P.	Wellington
Hruza, William J.		‡	Wandke, Otto E.	Fairmont
‡ Kraemer, George N.		‡	Watkins, John A.	Wellington
‡ Krause, Carl W.		‡	Williamson, Harold A.	Fairmont
‡ Lester, Malcolm J., Jr.		‡	Zemke, Erhart E.	Fairmont
‡ Lindahl, Merlyn J.		‡	Zemke, Robert L.	Fairmont

BROWN COUNTY MEDICAL SOCIETY

Brown County
Regular meetings, second Tuesday
January, April, July and October
Annual meeting in January
Number of members 26

PRESIDENT		‡	Kaiser, Milton L.	New Ulm
Kaiser, Milton		‡	Keithahn, Elmer E.	Sleepy Eye
SECRETARY		‡	Kitzberger, Peter J.	New Ulm
Vogel, Ann		‡	Muessing, William J.	New Ulm
‡ Black, William A.		†	Nuessle, Walter G.	Springfield
‡ Boyle, Francis J.		‡	Penk, Engward L.	Springfield
‡ Burnett, Joseph W.		†	Peterson, Roy A.	Vest
‡ Cairns, Robert J.		‡	Rimas, Mathew J.	Comfrey
Carthey, Frank J.		‡	Ringhofer, Lawrence	New Ulm
Fesenmaier, Otto B.		‡	Saffert, Cornelius A.	New Ulm
† Fritsche, Albert		‡	Vogel, Ann C.	New Ulm
‡ Fritsche, Carl J.		‡	Vogel, Howard A.	New Ulm
‡ Fritsche, Theodore R.		‡	Wing, Elton G.	Sleepy Eye
Gilles, Thomas F.		‡	Wohlrabe, Donald E.	Springfield
‡ Johnson, Rex R.		†‡	Wohlrabe, Edwin J.	Springfield

CAMP RELEASE DISTRICT MEDICAL SOCIETY Chippewa, Lac qui Parle and Yellow Medicine Counties Regular meetings, second Thursday of each month except July and August Annual meeting, December Number of members 24

PRESIDENT		‡	Anderson, Chester A.	Madison
Camp, Ray J.		‡	Birkey, Thomas G.	Montevideo
SECRETARY		‡	Boody, George J.	Cambridge
Westby, Norval M.		‡	Borgerson, M. A.	Hanley Falls
‡ Allen, John H.		†	Burns, Floyd M.	Milwaukee
		‡	Camp, Ray J.	Madison

COUNTY MEDICAL SOCIETY ROSTER

and Release District Medical Society (Continued)

Carter, Darrell L.	Granite Falls	‡	Lundell, Carl L.	Granite Falls
Carter, Kenneth R.	Granite Falls	‡	Maus, Philip W.	Dawson
Frank, Harvey	Montevideo	‡	Niazi, Suad A.	Granite Falls
Hagberg, Norman L.	Montevideo	‡	Owens, William A.	Montevideo
‡ Hauge, Malvin I.	Marcell		Radke, Robert L.	Milan
Johnson, Vilhelm M.	Dawson	‡	Rifat, Baseem M.	Clarkfield
Jordan, Kathleen B. Smith	Granite Falls		Roust, Henry A.	Montevideo
Kremer, Jerome L.	Montevideo	‡	Schmidt, Paul G.	Granite Falls
Lima, Ludvig R.	Montevideo	‡	Westby, Norval M.	Madison

CLAY-BECKER COUNTY MEDICAL SOCIETY

Clay and Becker Counties
Regular meeting date, April
Annual meeting, November
Number of members 30

RESIDENT			Groth, Mary K.	Moorhead
Colliton, P. A.	Moorhead	‡	Holtan, John	Moorhead
SECRETARY		†	Johnson, Olga H.	Moorhead
Ekberg, Fred	Detroit Lakes		Knapp, James F.	Detroit Lakes
Bigler, Earl E.	Perham	*	Koons, William R.	Mahnomen
Bigler, Ivan E.	Perham		Lorentzen, Ernest S.	Detroit Lakes
Bologna, Camillo V.	Moorhead		Midthune, Andreen S.	Lake Park
Bottolfson, B. T.	Moorhead		Nakamura, James Y.	Detroit Lakes
Brenk, Paul E.	Detroit Lakes		Odland, Mark E.	Detroit Lakes
Carlson, Donald L.	Moorhead	§	Refsland, Bradley	Detroit Lakes
Carlson, Vernon J.	Moorhead	‡	Rice, Hagbart G.	Moorhead
Collinge, James A.	Detroit Lakes	‡	Rutledge, John B.	Detroit Lakes
Colliton, Patrick A.	Moorhead	†	Rutledge, Lloyd H.	Detroit Lakes
Covey, Kenneth W.	Moorhead		Saxman, Gertrude O.	Ulen
Dodds, William C.	Detroit Lakes	‡	Simison, Carl	Barnesville
Duncan, James W.	Moorhead	‡	Thysell, Vernon D.	Moorhead
Ekberg, Fred	Detroit Lakes		Watson, Robert N.	Detroit Lakes
Geib, Marvin J.	Fargo, ND		Watson, Virgil A.	Detroit Lakes

EAST CENTRAL MINNESOTA MEDICAL SOCIETY

Anoka, Chisago, Isanti, Kanabec, Mille Lacs,
Pine and Sherburne Counties
Regular meetings first Tuesday of even
months of the year except August
Annual meeting, first Tuesday in December
Number of members 39

RESIDENT		‡	Lindquist, Dale C.	Lindstrom
Lamusga, David J.	Cambridge	‡	Mach, Ralph F.	Pine City
SECRETARY		‡	Magnuson, Raymond C.	Cambridge
McCamp, Carsten	Cambridge		Metcalf, Norman	Princeton
Aruguete, Alayne	St. Paul	‡	Murthy, K. V. K.	Mora
Bartholdt, H. P.	Mora	‡	Nelson, Luther A.	Rush City
Berglund, Alvin E.	Cambridge	‡	Nordman, Willard F.	Mora
Brettingen, Larry J.	Mora		Nygren, William T.	Braham
Bunker, Bevan W.	Anoka	‡	Overgaard, Peter H.	Lindstrom
Burseth, Edgar C.	Mora	‡	Peterson, Alvin C.	Mora
Deason, Keith B.	Chisago City	‡	Pivac (Popovich) Dragojla	Milwaukee, WI
Erickson, Carlton	Lindstrom	‡	Reiners, Gary	Cambridge
Ericsson, Kermit C.	Cambridge		Ristic, Miodrag	Cambridge
Gaillitis, Veronika M.	St. Paul	‡‡	Roehlke, Arthur E.	Elk River
Grinvalds, Anna O.	St. Paul	‡	Runquist, Richard	Cambridge
Hartzler, Paul L.	Cambridge	‡	Seecamp, Carsten H.	Cambridge
Hovde, Gordon W.	Chisago City		Sommer, R. K.	Elk River
Huber, Robert W.	St. Croix Falls, WI	†	Spurzem, Raymond J.	Anoka
Hubin, Edwin G.	Sandstone	‡‡	Stratte, Alf K.	Pine City
Johnson, Aldridge F.	Isanti	‡	Swenson, Roy G.	North Branch
Kelsey, Carleton G.	St. Paul	‡	Tesch, Gordon H.	Elk River
Lamusga, David J.	Cambridge	‡	Textor, Jerome D.	Champlin
Larson, Gerald E.	Cambridge	‡	Travis, Richard C.	Elk River

COUNTY MEDICAL SOCIETY ROSTER

FREEBORN COUNTY MEDICAL SOCIETY

Freeborn County

Regular meetings, third Thursday of even months

Annual meeting, December

Number of members 35

PRESIDENT

Myers, Theodore P.Albert Lea

SECRETARY

Ellertson, Leonard M.Albert Lea

† Barr, Lowell C.Albert Lea

† Barr, Lowell W.Albert Lea

† Bartness, John E.Albert Lea

† Blumer, Arlo R.Albert Lea

† Buege, WilliamAlbert Lea

† Burns, CatherineExcelsior

† Burns, James F.Albert Lea

† Cole, George A.Albert Lea

† Demo, Robert A.Albert Lea

† Egge, Sanford G.Albert Lea

† Ellertson, Leonard M.Albert Lea

† Erdal, Ove A.Albert Lea

† Gamble, Elbert J.Roseville

† Gill, Theodore M.Albert Lea

† Halvorson, Harold C.Albert Lea

† Hansen, Theodore M.Albert Lea

† Keil, Marcus A.Albert

† Menefee, Edward C.Albert

Myers, Theodore P.Albert

† Neel, Harry B.Albert

Nelson, Clayton E. J.Albert

Nesheim, Martin O.Albert

†† Palmer, Clinton G.Albert

Pogue, Charles G.Albert

† Rose, CordtAlbert

Schmidt, Ruben F.Al

† Shepard, RichardAlbert

† Sherman, Alfred G.Albert

† Steiner, Leon E.Albert

† Stoker, Lynn C.Albert

† Thompson, Thoburn F.Albert

† Treanor, Thomas A.Albert

† Whitson, Sidney A.Albert

† Wilcox, G. CharlesAlbert

† Willie, James A.Albert

GOODHUE COUNTY MEDICAL SOCIETY

Goodhue County

Regular meeting, April and November

Annual meeting, November

Number of members 29

PRESIDENT

Delahunty, John R.Red Wing

SECRETARY

Schulenberg, Robert N.Red Wing

† Akins, Willard M.Red Wing

† Billings, Harry H.Red Wing

† Biltz, John F.Red Wing

† Bruns, Donald L.Red Wing

†† Brusegard, James F.Red Wing

† Delahunty, John R.Red Wing

Douglass, Jesse E.Cannon Falls

Falls, John L.Red Wing

† Fauchald, Nils, Jr.Red Wing

Friedrich, Bradford E.Red Wing

† Halvorson, James W.Zumbrota

† Hartnagel, Grant F.Red Wing

† Hawley, George M. B.Red Wing

† Jackish, George E.Red V g

† Juers, Edward H.Red V g

Kuehner, Marvin E.Red V

† Larson, Oliver E. H.Zumbrota

Leaf, Donn S.Red V g

† Molenaar, Robert E.Cannon F ls

† Moshfeghi, Mohammad M.Red V g

Rayner, Ralph R.Red V g

† Roth, Charles W.Red V g

† Sander, John L.Red V g

Schroeder, Glenn E.Red V g

Schulenberg, Robert N.Red V g

Sherman, Royal V.Red V g

Walter, William E.Wanam go

† Wasmund, Clarence W.Red V g

† Williams, Marland R.Cannon F ls

HEADWATERS MEDICAL SOCIETY

Beltrami, Clearwater and Lake of the Woods Counties

Regular meetings to be determined

Annual meeting, 2nd Saturday in September

Number of members 27

PRESIDENT

Reeber, ErickBagley

SECRETARY

Gregoire, EarlBemidji

† Brink, Adlai A.Baudette

Deweese, Joel T.Bemidji

Deweese, Wilford J.Bemidji

† Franklin, Gordon W.Northome

Gregoire, EarlBemidji

Griffin, John W.Bemidji

Hildebrand, John E.Bemidji

Hoganson, Donald E.Bemidji

† Janecky, Allen G.Baudette

† Johnson, Einer W.Bemidji

† Larson, Leroy J.Bagley

Lundsten, Leslie C.Bemidji

Martin, Frederick F.B: ay

Nordlund, Mildred E.Cass ke

Palmer, Harry A.Black ck

Pearson, Harris L.B: e)

Reeber, ErickB: e)

† Reid, Howard C.Be d)

† Roholt, Hartvig B.Be d)

Slater, Edward C.Be d)

Sondreal, Wesley D.Be d)

Thompson, James R.Be d)

Whittemore, Dexter D.Be d)

Will, Theodore J.Be d)

† Wilson, Bruce C.Be d)

Winkler, Gary L.Be d)

Wohlfel, Dwayne L.Be d)

COUNTY MEDICAL SOCIETY ROSTER

HENNEPIN COUNTY MEDICAL SOCIETY

Hennepin County

Regular meetings, first Monday of the Months of
October, January, March and May, except when
otherwise designated

Annual meeting, first Monday in October

Number of members 1544

RESIDENT	
aBrec, John	Minneapolis
SECRETARY	
und, George W.	Minneapolis
EXECUTIVE SECRETARY	
Ioban, Thomas W., Mr.	Minneapolis
Abramson, Burton I.	Minneapolis
Abramson, Milton	Minneapolis
Abullarade, Jose A.	Minneapolis
Abuzzahab, Faruk S., Sr.	Minneapolis
Adams, Richard I.	Minneapolis
Adicoff, Arnold	Minneapolis
Adkins, C. Douglas	Minneapolis
Adkins, James T.	Coon Rapids
Agee Andrew R.	Minneapolis
Agustsson, Hreidar	Minneapolis
Ahern, Eugene E.	Minneapolis
Akbar, Sajady	Minneapolis
Aksoy, Mustafa M.	St. Paul
Alari, Heino	Excelsior
† Aling, Charles A.	Minneapolis
Alkon, Ellen	Minneapolis
Allen, James R.	Minneapolis
Alt, Thomas H.	Minneapolis
Alter, Milton	Minneapolis
Amatuzio, Donald S.	Minneapolis
Amren, Don P.	Minneapolis
Anderegg, Alfred F.	Minneapolis
Andersen, James G.	Minneapolis
Andersen, Robert C.	Minneapolis
Anderson, Arnold S.	Minneapolis
Anderson, David M.	Minneapolis
Anderson, Darrel R.	Hopkins
† Anderson, Ernest R.	Minneapolis
Anderson, Frank J.	Minneapolis
Anderson, John A.	Minneapolis
Anderson, John R.	Minneapolis
† Anderson, Karl W.	Excelsior
Anderson, Quentin N.	Minneapolis
Anderson, Richard W.	Minneapolis
Anderson, Roger E.	Minneapolis
Anderson, Roger L.	Minneapolis
Anderson, Thomas P.	Minneapolis
Anderson, U. Schuyler	Sun City, AR
Anderson, Wallace E.	Minneapolis
Anderson, William H.	Minneapolis
Anderson, William T.	Minneapolis
Anderson, W. Robert	Minneapolis
Andre, James C.	Minneapolis
Andreassen, Einar C.	Minneapolis
Andreassen, Rolf L.	Minneapolis
Andresen, Karl d'A	Minneapolis
Ankner, Frank J.	Minneapolis
Anonsen, Richard E.	Minneapolis
Anselment, Lois A.	Excelsior
Arenson, Jeffrey A.	Minneapolis
Arey, Stuart Lane	Minneapolis
Arhelger, Stuart W.	Minneapolis
Arlander, Clarence E.	Minneapolis
Arlander, Thomas R.	Minneapolis
Arling, Leonard S.	Minneapolis
Arms, James J.	Minneapolis
Armstrong, Byron H.	Minneapolis
† Arnold, Ann W.	Minneapolis
Arnold, Thomas B.	Minneapolis
Atkins, F. Eliska	Minneapolis
Aughenbaugh, John W.	Minneapolis
† Avant, Robert F.	Minneapolis
Azad, Manouchehr	Minneapolis
Azam, Ansari	Minneapolis
Azzam, Fouad G.	Minneapolis
Bachmann, Sigrid A.	St. Paul
† Backus, Reno E.	Minneapolis
† Baggenstoss, Osmond J.	Minneapolis
† Bagley, Russell W.	Minneapolis
Baken, Melvin P., Jr.	Minneapolis
Baker, Abe B.	Minneapolis
† Baker, C. Camak	Minneapolis
† Baker, Daniel R.	Minneapolis
† Baker, Lowell H.	Minneapolis
† Baker, Milton E.	Minneapolis
Bakke, Arnold C.	Minneapolis
† Balcos, Emmanuel G.	Minneapolis
† Balkin, Samuel G.	Minneapolis
† Balkins, John W.	Minneapolis
† Balogh, Charles J.	Minneapolis
Bandt, Calvin M.	Minneapolis
† Bank, Harry E.	Minneapolis
Banovetz, John D.	Minneapolis
† Barnett, Robert M.	Minneapolis
† Barno, Alex	Minneapolis
† Barr, Maxwell M.	Minneapolis
† Barrett, Patrick J.	Minneapolis
Barron, Jesse J.	Minneapolis
†† Barron, Moses	Beverly Hills, CA
† Barry, George J.	Minneapolis
† Bart, Bruce J.	Minneapolis
Baumgartner, C. John	Minneapolis
† Beach, Northrop	Minneapolis
Beard, Archibald H., Jr.	Minneapolis
Becklund, Roger W.	Minneapolis
Beecher, Lee H.	Minneapolis
† Beeman, John A.	Minneapolis
Beirstein, Samuel	Minneapolis
† Beiswanger, Richard H.	Edina
† Bell, Donald C.	Minneapolis
Bellville, Titus P.	Minneapolis
Belzer, Meyer S.	Minneapolis
† Bendel, Richard P.	Minneapolis
Bendel, William L., Jr.	Coon Rapids
Benesh, Louis A.	Minneapolis
† Benjamin, Edwin G.	Minneapolis
† Benjamin, Harold G.	Minneapolis
Benjamin, Richard D.	Minneapolis
† Benjamin, Robert B.	Minneapolis
Bensman, Alan S.	Minneapolis
† Bentz, Herman D.	Anoka
† Berestka, Stephen J.	Minneapolis
Berg, Clinton C.	Excelsior
Berger, Alex G.	Minneapolis
† Bergh, George S.	Minneapolis
Bergh, Solveig M.	Minneapolis
† Berglund, Eldon B.	Minneapolis
† Bergquist, James R.	Minneapolis
Bergstrom, Ralph W., Jr.	Maple Plain

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡ Bergstrom, William J.	Minneapolis	‡ Buchwald, James A.	Minneapolis
† Berkwitz, Nathaniel J.	Minneapolis	‡ Buckley, Joseph J.	Minneapolis
Berman, David A.	Minneapolis	‡ Bugby, Robert D.	Minneapolis
Berman, Reuben	Minneapolis	‡ Bugenstein, Robert H.	Minneapolis
Bernstein, Dorothy M.	Minneapolis	‡ Buie, Louis A., Jr.	Minneapolis
Bernstein, Irving C.	Minneapolis	‡ Bundt, Robert E.	Minneapolis
‡ Berris, Harold	Minneapolis	‡ Buran, David J.	Minneapolis
Berry, Ronald N.	Minneapolis	‡ Burchell, Howard G.	Minneapolis
‡ Berzins, Rainis	Minneapolis	‡ Burkholder, Dayton D.	Anok
†‡ Bessesen, Alfred N.	Minneapolis	‡ Burnham, Wesley H.	Minneapolis
‡ Bevis, William D.	Minneapolis	‡ Burton, Thomas P.	Minneapolis
Bieger, R. Cyril	Minneapolis	‡ Cable, Morris L.	Minneapolis
Biery, M. Barbara	Minneapolis	† Cabot, Clyde M.	Ft. Lauderdale, F
Bieter, Raymond N.	Minneapolis	‡ Calin, S. Hartley	Minneapolis
‡ Bilgutay, Aydin M.	Minneapolis	‡ Cameron, Bruce P.	Minneapolis
Bilka, Paul J.	Minneapolis	† Cameron, Isabell L.	Minneapolis
Billman, Herbert R.	Minneapolis	‡ Campbell, Denis V.	Minneapolis
Binder, Manuel R.	Minneapolis	‡ Campbell, Marilyn R. M.	Minneapolis
Bingham, George C.	Pensacola, FL	† Campbell, Orwood J.	Tucson, A
Bishop, James R.	Excelsior	‡ Campbell, Ronald G.	Minneapolis
Bittick, Wilbur H.	Minneapolis	‡ Card, William H.	Minneapolis
‡ Blackard, Clyde E.	Minneapolis	‡ Cardle, James G.	Minneapolis
‡ Blake, Allan J.	Hopkins	‡ Cardle, John B.	Minneapolis
‡ Blake, James A.	Hopkins	‡ Carlander, Lester W.	Minneapolis
‡ Blake, Paul S.	Minneapolis	‡ Carlson, Charles V.	Mou
Bland, Charles S.	Minneapolis	‡ Carlson, Clifford	Minneapolis
Blatti, George M.	Minneapolis	‡ Carlson, Curtis H.	Minneapolis
‡ Bloedel, Traugott J.	Osseo	‡ Carlson, David J.	Minneapolis
‡ Blomberg, Robert D.	Minneapolis	‡ Carlson, Lawrence	Minneapolis
‡ Bloom, David	Minneapolis	‡ Carlson, Pamela N.	Minneapolis
Bloom, Norman B.	Minneapolis	‡ Carlson, Richard	Minneapolis
‡ Blumenthal, Malcolm N.	Minneapolis	‡ Carr, William J.	Minneapolis
‡ Boardman, Peter J.	Wayzata	‡ Carrier, Thomas C.	Minneapolis
‡ Boardman, William J.	Minneapolis	‡ Carrasco, Enrique	Minneapolis
Bofenkamp, Benjamin	Minneapolis	‡ Caspers, Carl G.	Minneapolis
†‡ Boies, Lawrence R., Sr.	Hopkins	‡ Cauble, Charles F.	Minneapolis
Boller, M. A.	Minneapolis	‡ Cava, Eugenio A.	Fridle
£ Bolt, Donald A.	Jackson, FL	†‡ Cavanor, Frank T.	Minneapolis
‡ Bonewell, George W.	Minneapolis	‡ Cavert, H. Mead	Minneapolis
Borman, Chauncey N.	Minneapolis	‡ Ceder, Elmer T.	Minneapolis
Boros, Stephen J.	Minneapolis	‡ Cella, Joseph A.	Minneapolis
Borowicz, Leonard A.	Minneapolis	‡ Chadbourn, Wayne A.	Minneapolis
Borrud, Chester C.	Anoka	‡ Challman, S. Alan	Minneapolis
Bouthilet, Florence J.	St. Paul	‡ Chandler, William M.	Minneapolis
† Bowers, Gordon G.	Excelsior	‡ Chedister, Charles R.	Minneapolis
‡ Bowlin, Paul F.	Minneapolis	‡ Chervenak, William A.	St. Pa
† Boynton, Ruth E.	Miami, FL	‡ Chesler, Merrill D.	Minneapolis
‡ Bóyum, Allan J.	Minneapolis	‡ Child, Sherman B.	Minneapolis
‡ Bradford, David S.	Minneapolis	‡ Chisholm, Tague C.	Minneapolis
Bradley, Jeanne B.	Minneapolis	‡ Chou, Shelley N.	Minneapolis
Bradley, John G.	Minneapolis	‡ Christensen, Llewellyn E.	Minneapolis
Bradley, William E.	Minneapolis	‡ Christenson, Leland R.	Minneapolis
‡ Brandt, Henry E.	Minneapolis	‡ Christgau, Roger A.	Minneapolis
‡ Bransford, Paul W.	Minneapolis	‡ Christian, William L.	Minneapolis
‡ Brauer, William W.	Minneapolis	‡ Cich, John A.	Minneapolis
‡ Braun, Rene	Minneapolis	‡ Clark, Malcolm D.	Minneapolis
‡ Breitenbucher, Robert B.	Minneapolis	‡ Clark, Robert S.	Minneapolis
†‡ Brekke, Harvey J.	Minneapolis	‡ Clay, Lyman B.	Minneapolis
‡ Brennan, Joseph G.	Minneapolis	‡ Cline, David W.	Minneapolis
Brill, Alice K.	Bloomington	‡ Cochran, Ray F.	Minneapolis
‡ Briones, Bienvenido R.	Hopkins	‡ Coe, John I.	Minneapolis
‡ Brodsky, Ivan L.	Minneapolis	‡ Cohan, Richard C.	Minneapolis
‡ Bromer, Michael D.	Minneapolis	‡ Cohen, Bernard A.	Minneapolis
† Brooks, Charles N.	Wayzata	‡ Cohen, Ephraim B.	Minneapolis
Brown, David M.	Minneapolis	‡ Cohen, Henry W.	Wayza
‡ Brown, John H.	Minneapolis	‡ Cohen, Sumner S.	Minneapolis
‡ Brown, William D., Jr.	Minneapolis	‡ Coifman, Robert	Minneapolis
‡ Brownfield, James A.	Minneapolis	‡ Cole, James S.	Minneapolis
‡ Buchstein, Harold F.	Minneapolis	‡ Coleman, Thomas P.	Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡ Conlon, Daniel C.Minneapolis
 † Connor, David G.San Francisco, CA
 ‡ Cooper, John P.Minneapolis
 ‡ Cooper, Robert R.Minneapolis
 † Corniea, Albert D.Minneapolis
 Correa, Dale H.Minneapolis
 Corson, Wilfred A.Minneapolis
 ‡ Cortez, Daniel P.Minneapolis
 ‡ Coulter, Harold E.Minneapolis
 Coyne, Terence P.Minneapolis
 Craig, M. ElizabethMinneapolis
 ‡ Cranmer, Richard R.Laguna Hills, CA
 Cranston, Robert W.Minneapolis
 ‡ Creevy, Charles D.Minneapolis
 Croissant, Raymond C.Minneapolis
 † Crossley, Kent B.Boston, MA
 ‡ Crowley, Leonard V.Minneapolis
 Cruz, Waldemar F.Minneapolis
 ‡ Cullado, Andrionico F.Minneapolis
 Culligan, Leo C.Minneapolis
 ‡ Cundy, Donald T.Minneapolis
 ‡ Curran, John P.Minneapolis
 Cushing, Richard T.Minneapolis
 † Cutts, GeorgeMinneapolis
 ‡ Daggett, Donald R.Minneapolis
 Dahl, James C.Minneapolis
 † Dahl, John A.Minneapolis
 ‡ Dahlstrom, Donald D.Minneapolis
 † Daniel, Donald H.Wayzata
 Daniels, Clarke G.Minneapolis
 Danoff, DavidMinneapolis
 ‡ Danyluk, MichaelMinneapolis
 Dargay, Cyril P.Minneapolis
 ‡ Daumann, Roy E.Minneapolis
 David, ReubenHopkins
 Davis, Curtis E.Minneapolis
 ‡ Davis, Michael W.Minneapolis
 Davis, Thomas H.Minneapolis
 Dawson W. John, Jr.Minneapolis
 Deaton, Burrell H.Minneapolis
 Dedeker, Kenneth L.Wayzata
 De Haan, Eddie D.Minneapolis
 Delzell, Allen W.Minneapolis
 † Diamond, Robert A.Minneapolis
 Dickman, Roy W.Minneapolis
 Diego, Benito B.Fridley
 † Diehl, Harold S.New York, NY
 Diehl, James J.Minneapolis
 Dierker, Heinrich A.Minneapolis
 ‡ Diessner, Henry D.Hopkins
 Dimants, Janis, Jr.Minneapolis
 † Doan, Robert E.Wayzata
 Docherty, John A.Minneapolis
 Donatelle, Edward P.Minneapolis
 † Dorge, RichardMinneapolis
 Dornbach, Robert A.Minneapolis
 † Dorsey, George C., Jr.Minneapolis
 Dorsey, William E.Minneapolis
 Doscherholmen, AlfredMinneapolis
 Dougan, Jerome W.Minneapolis
 doVale, Joao M.Edina
 Doxey, Gilbert L.Minneapolis
 Drage, Charles W.Minneapolis
 Dredge, Thomas E., Sr.Minneapolis
 Drill, Frederick E.Minneapolis
 Drill, Herman E.Hopkins
 Dummer, Donald J.Minneapolis
 Duncan, Donald A.Minneapolis
 † Dunkel, Thomas B.Minneapolis
 Dunlap, David J.Minneapolis

‡‡ Dunlap, Earl H.Minneapolis
 ‡ Dupont, Joseph A.Excelsior
 Duryea, Willis M.Minneapolis
 Duryea, Willis M., Jr.Minneapolis
 Dvorak, Benjamin A.Minneapolis
 ‡ Dwan, Paul F.Minneapolis
 † Dworsky, Samuel D.Minneapolis
 Earl, Stephan H.Minneapolis
 Ebert, Richard V.Minneapolis
 Eckerly, Jean R.Minneapolis
 ‡ Eder, Walter P.Minneapolis
 Edmondson, Hugh A., Jr.Minneapolis
 ‡ Efteland, Myles E.Minneapolis
 ‡ Ehrlich, S. PaulMinneapolis
 † Eich, Matthew A.Minneapolis
 Eichenlaub, John E.Minneapolis
 ‡ Eichhorn, Edmund P., Jr.Minneapolis
 £ Eichten, John G.Minneapolis
 ‡ Eifrig, David E.Minneapolis
 ‡ Einzig, Mitchell J.Wayzata
 Eisenberg, M. MichaelMinneapolis
 ‡ Eisenstadt, William S.Minneapolis
 Eitel, George D.Minneapolis
 Ellingson, Richard B.Minneapolis
 Ellington, Anna L.Minneapolis
 ‡ Ellis, Cassius M. C., IIIMinneapolis
 ‡ Ellis, John C., Jr.Minneapolis
 ‡ Ellison, Evan S.Minneapolis
 ‡ Elwood, Paul M., Jr.Minneapolis
 † Emond, Joseph S.Farmington
 Emond, Joseph S., Jr.Farmington
 ‡ Engel, Joseph P.Minneapolis
 Engel, William L.Minneapolis
 ‡ Englund, Elvin F.Minneapolis
 ‡ Engstrom, E. DuaneMinneapolis
 ‡ Engwall, Richard L.Minnetonka
 Erickson, Jeffrey L.Minneapolis
 ‡ Erickson, Laurence F.Minneapolis
 ‡ Erickson, Myron E.Minneapolis
 ‡ Ericson, John E.Minneapolis
 £ Ersek, Robert A.Minneapolis
 ‡ Eselius, Erik P.Minneapolis
 ‡ Esensten, SidneyMinneapolis
 ‡ Etzwiler, Donnell D.Minneapolis
 Eusebio, ErnestoMinneapolis
 ‡‡ Evans, Edward T.Minneapolis
 ‡ Everhart, Clarence E., Jr.Minneapolis
 Everly, Stephan S.Minneapolis
 Fallon, Virgil T.Minneapolis
 Farber Abigail F.Minneapolis
 ‡ Farber, Lawrence A.Minneapolis
 Farber, Roger E.Minneapolis
 ‡ Farber, Lawrence A.Minneapolis
 Farley, Harrison H.Minneapolis
 Farrell, T. EdwinMinneapolis
 ‡ Fehr, Peter E.Minneapolis
 ‡ Feigal, David W.Wayzata
 Feinberg, PhilipMinneapolis
 Feinberg, Samuel B.Minneapolis
 ‡ Fernandez, Rafael F., Jr.Minneapolis
 Fetzek, Albert D.Minneapolis
 ‡ Field, CharlesHopkins
 Fifer, Ellen Z.Minneapolis
 Fifer, William R.Minneapolis
 Filiatrault, L. J.Minneapolis
 Filipovich, Orest N.Minneapolis
 ‡ Fingerman, David L.Minneapolis
 ‡‡ Fink, Leo W.Minneapolis
 ‡ Fink, Robert J.Minneapolis
 Finkelstein, JoelMinneapolis

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

	Finlayson, Richard E.	Minneapolis
‡	Finstad, James E.	Minneapolis
†	Fisher, Albert P., Jr.	Minneapolis
	Fisher, Don H.	Minneapolis
	Fisher, Howard W.	Minneapolis
‡	Fisher, Isadore	Minneapolis
	Flemenbaum, Abraham	Minneapolis
	Fleming, Dean S.	Minneapolis
‡	Fliehr, Richard R.	Minneapolis
‡	Flora, George C.	Minneapolis
	Flory, W. Daniel	Minneapolis
	Foker, Leslie W.	Minneapolis
	Foley, Robert R.	Minneapolis
‡	Foley, William A.	Minneapolis
‡	Folsom, Louis B.	Minneapolis
	Forbes, Edward F.	Minneapolis
†	Ford, W. Harold	Hopkins
	Fortuny, Ignacio E.	Minneapolis
	Foss, Donald L.	Minneapolis
‡	Foster, Orley W.	Minneapolis
	Fox, Donald P.	Minneapolis
‡	Fox, James Rogers	Edina
‡	Frale, Elwin E.	Minneapolis
‡	Frane, Donald B.	Minneapolis
‡	Frane, Gerald T.	Minneapolis
‡	Fredlund, Jon S.	Anoka
‡	Freeman, Craig W.	Minneapolis
	Freeman, Donald W.	Minneapolis
	French, Lyle A.	Minneapolis
‡	Frey, Richard J.	Minneapolis
	Friberg, Joseph B.	Minneapolis
	Fried, Louis A.	Minneapolis
†	Friedell, Aaron	Minneapolis
	Friedell, George	Minneapolis
‡	Friedman, Harry S.	Minneapolis
‡	Friend, Charles A.	Minneapolis
	Fromke, Vincent L.	Minneapolis
‡	Frost, John B.	Minneapolis
	Fruchtman, Stanley A.	Minneapolis
‡	Frys, Russell N.	Minneapolis
	Fuglestad, Edson V.	Minneapolis
‡	Fuglestad, J. Roald	Minneapolis
†	Fuller, Alice H.	Minneapolis
†‡	Funk, Victor K.	Hopkins
	Furman, Christine	Minneapolis
	Gaard, Richard C.	Robbinsdale
‡	Gage, James R.	Minneapolis
‡	Galbraith, Richard F.	Minneapolis
	Gallagher, Larry J.	Mound
‡	Gallett, Lester E.	Minneapolis
†	Galligan, Margaret Mary D.	Minneapolis
	Galway, Charles F.	Minneapolis
	Gamble, William G.	Minneapolis
‡	Gannon, Paul G.	Minneapolis
‡	Garamella, Joseph J.	Minneapolis
	Garcia, Oscar	Minneapolis
	Garetz, Floyd K.	Minneapolis
‡	Garske, George L.	Minneapolis
	Garten, Joseph L.	Minneapolis
‡	Garvey, James T.	Minneapolis
‡	Garvis, Gary E.	Minneapolis
	Gasik, Joseph M.	Minneapolis
	Gauger, David W.	Minneapolis
‡	Gault, N. L., Jr.	Minneapolis
	Gaviser, David	Minneapolis
	Geis, LeRoy F.	Minneapolis
	Geller, Joseph	Minneapolis
‡	Gendron, Joseph L.	Minneapolis
‡	Gentry, William C., Jr.	Minneapolis

	George, Vane P., Jr.	Le Sueur
	Gerster, Paul W.	Anoka
	Gesundheit, Sim	Minneapolis
	Gibbs, Robert W.	Minneapolis
‡	Giebenhain, John N.	Minneapolis
†‡	Giere, Joseph C.	Minneapolis
†	Giere, Richard W.	Minneapolis
	Gilbert, Maurice G.	Minneapolis
	Gilbertsen, A. Sigrid	Minneapolis
	Gilbertsen, Victor A.	Minneapolis
	Gilles, Paul J.	Minneapolis
	Gillund, T. Dean	Minneapolis
†	Gingold, Benjamin A.	Minneapolis
	Glaeser, John H.	Minneapolis
	Godfrey, H. Wilson	Minneapolis
‡	Goehl, Reinhold O., Jr.	Minneapolis
	Goetz, Carlos	Coon Rapids
	Gokcen, Barbara W.	Minneapolis
	Gokcen, Muharrem	Minneapolis
†	Goldberg, Isadore M.	Minneapolis
	Goldberg, Marvin E.	Minneapolis
‡	Goldberg, Stanley M.	Minneapolis
	Goldfarb, Benjie L.	Minneapolis
	Goldfarb, Mace G.	Minneapolis
†	Goldman, Theodore I.	Minneapolis
‡	Goldner, Meyer Z.	Minneapolis
	Goldstein, Alan L.	Hopkins
	Goltz, Robert W.	Minneapolis
‡	Good, Gary	Minneapolis
	Goodale, Robert L., Jr.	Minneapolis
	Goodchild, William R.	Minneapolis
	Gordon, John R.	Minneapolis
‡	Gordon, Sewell S.	Minneapolis
‡	Gozum, Ekrem	Minneapolis
	Grados, Carlos	Coon Rapids
	Grage, Theodor	Minneapolis
	Graham, John J.	Minneapolis
	Granquist, Richard D.	Minneapolis
‡	Grant, James B.	Minneapolis
	Grant, Suzanne	Minneapolis
*†	Gratzek, Frank R.	Anoka
†	Gray, Royal C.	Minneapolis
#	Greden, John F.	Wheaton
	Green, Clayton R.	Excelsior
	Green, Robert A.	Minneapolis
	Greenberg, Albert J.	Minneapolis
	Greene, Leonard H.	Minneapolis
	Greenfield, Irving	Minneapolis
¶	Greisheimer, Esther M.	Wayne, PA
†	Grimes, Marian	Minneapolis
	Grimmell, Francis J.	Minneapolis
	Grossling, Higinia C.	Minneapolis
	Grossling-Freudenberg, Sergio	Minneapolis
	Grube, David W.	Minneapolis
‡	Gruys, Robert I.	Edina
‡	Guerrero, Rafael A.	Minneapolis
	Gullickson, Glenn, Jr.	Minneapolis
‡	Gunlaugson, Frederick G.	Minneapolis
‡	Gustafson, Paul O.	Minneapolis
	Gustafson, Robert W.	Mound
‡	Gustason, Harold T.	Minneapolis
	Gustilo, Ramon B.	Minneapolis
	Gutenkauf, Joseph J.	St. Paul
	Haas, John W.	Minneapolis
‡	Haberle, Charles A.	Minneapolis
‡	Hagen, Kristofer	Minneapolis
‡	Hagen, Wayne S.	Minneapolis
‡	Haglin, John J.	Minneapolis
‡	Hakim, Ali A.	Minneapolis
‡	Hall, Arthur M.	Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

Hall, Fredric C.	Minneapolis	†	Hodges, Kenneth V.	Minneapolis
† Hall, Harry B.	Minneapolis	†	Hoffert, Henry E.	Minneapolis
† Hall, Loren J.	Minneapolis		Hoffman, Neil R.	Minneapolis
† Hall, Wendell H.	Minneapolis	†	Hoffman, Roy A.	Minneapolis
Hambidge, Gove, Jr.	Minneapolis	†	Hoffman, Walter Lees	Minneapolis
Hamel, Arnold L.	Minneapolis	†	† Hofmann, Gerald N.	Minneapolis
Hamel, Joseph I.	Minneapolis	†	† Holm, Donald F.	Minneapolis
† Hammerstrom, Robert N.	Minneapolis	†	† Holmberg, Conrad J.	Minneapolis
† Handler, Seymour	Minneapolis		Holzapfel, Fred C.	Minneapolis
† Hanisch, Edward C., Jr.	Minneapolis	†	† Hopperstad, J. Jerome	Minneapolis
† Hansen, Cyrus O.	Minneapolis	†	† Hoppes, Emerson E.	Minneapolis
*†† Hansen, Erling W.	Minnetonka	†	† Horecki, Henry	Minneapolis
Hansen, Olga S.	Minneapolis		Horns, Howard L.	Minneapolis
Hansen, Rollin M.	Minneapolis	†	† Horns, Norman	Minneapolis
Hanske, Edward A.	Minneapolis	†	† Horns, Richard C.	Minneapolis
Hanson, A. Stuart	Minneapolis		Horowitz, Arthur J.	Minneapolis
† Hanson, Harlow J.	Minneapolis		Hoseth, Wayne L.	Minneapolis
Hanson, Harold B.	Burnsville		Hosfield, William B.	Minneapolis
Hanson, Harold W.	Minneapolis	†	† House, James H.	Minneapolis
Hanson, Mark C. L.	Minneapolis	†	† Householder, James R.	Minneapolis
Hanson, Mildred S.	Minneapolis		Hovland, Melvin L.	Minneapolis
† Hanson, Stephen L.	Minneapolis	†	† Hovland, Richard D.	Minneapolis
Hanson, William A. H.	Minnetonka	£	Howard, Richard J.	Edina
Hanson, William	Minneapolis		Howard, Robert B.	Minneapolis
Harkness, John W.	Minneapolis		Howard, Solomon E.	Minneapolis
Harris, Leon D.	Bloomington	†	Howell, Carter W.	Minneapolis
Harris, James D.	Minneapolis		Howell, John L.	Minneapolis
Hart, Terril H.	Wayzata	†	Hoyt, C. Sherman	Minneapolis
Hartig, Paul R.	Minneapolis	†	† Huff, John S.	Minneapolis
Hartman, Evelyn E.	Minneapolis	†	† Hulteng, Donald B.	Fridley
Hartwig, John A.	Minneapolis		Hung, Jui-Sung	Minneapolis
Harty, Jerome L.	Fridley	†	† Hurr, Maland C.	Minneapolis
Harvey, Clyde B.	Minneapolis	†	† Hustad, Edward G.	Minneapolis
Hass, Frederick M.	Minneapolis	†	† Hymes, Alan C.	Minneapolis
Hastings, Donald W.	Minneapolis	†	† Hymes, Charles	Minneapolis
Hauge, Erling T.	Minneapolis	†	† Idstrom, Linneus G.	Minneapolis
Haugen, George W.	Minneapolis	†	† Indeck, Walter	Minneapolis
Haugen, John A.	Minneapolis		Ingalls, Edgar G.	Minneapolis
Hauser, Donald C.	Minneapolis	†	† Iverslie, Phillip C.	Minneapolis
Havel, Robert J.	Minneapolis		Iverson, Eleanor B.	Minneapolis
Haven, Walter K.	Minneapolis	†	† Iverson, Rolf M.	Minneapolis
Hawkinson, Raymond P.	Minneapolis	†	† Jackson, J. Albert	Minneapolis
Hay, Lyle J.	Minneapolis	†	† Jackson, Richard L.	Minneapolis
Haywa, E. William	Minneapolis	†	† Jacobson, Leslie W.	Minneapolis
†† Head, Douglas P.	Minneapolis		† Jacobson, Loren J.	Minneapolis
Hebbel, Robert	Minneapolis		Jacobson, Wyman E.	St. Louis Park
Hedrick, William L.	Minneapolis		Jacoby, John S.	Minneapolis
Heinz, John N.	Minneapolis	†	† Jaffe, Manuel O.	Minneapolis
Heithoff, Kenneth B.	Bloomington		Ide, Arthur W., Jr.	Minneapolis
Helgaas, Steffen A.	Farmington	†	† Janda, George W.	Minneapolis
Heller, Ben I.	Minneapolis		Jarvis, Mary B.	Minneapolis
Heller, Steven A.	Minneapolis		Jay, Alan R.	Temple, TX
Hempel, Dean J.	Minneapolis	†	† Jefferies, William L.	Minneapolis
Henrikson, Earl C.	Minneapolis	†	† Jensen, Nathan K.	Minneapolis
Herbert, Willis L.	Minneapolis	†	† Jensen, Paul A.	Minneapolis
Hess, Carroll N.	Minneapolis		Jensen, Reynold A.	Minnetonka
Hess, Sheldon	Minneapolis		Jerome, Bourne	Minneapolis
Heupel, Hermann W.	Minneapolis		Jerome, Elizabeth B. K.	Minneapolis
Hewitt, Marshall I.	Minneapolis	†	† Jeub, Robert P.	Minneapolis
Hiatt, John A.	Minneapolis	†	† Johanson, James E.	Minneapolis
Hickok, David F.	Minneapolis		Johnson, Alan R.	Minneapolis
Hiduchenko, Katherine	Minneapolis		Johnson, Angelo G.	Minneapolis
Hildebrandt, Walter C.	Minneapolis	†	† Johnson, Arthur B.	Minneapolis
Hilgedick, William R.	Minneapolis		Johnson, Bradley D.	Minneapolis
Hilgermann, George O.	Minneapolis		Johnson, Curtis A.	Minneapolis
Hill, David L.	Minneapolis		Johnson, David R.	Minneapolis
Hill, Earl	Minneapolis	†	† Johnson, Donald A.	Minneapolis
Hill, Elmer M.	Minneapolis	†	† Johnson, Edward A.	Minneapolis
Hiller, Bruce H.	Minneapolis	†	† Johnson, Frank E.	Minneapolis
Hitchcock, Claude R.	Minneapolis	†	† Johnson, Gordon E.	Minneapolis
		†	† Johnson, Harry A., Jr.	Minneapolis

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

†† Johnson, James A.	Minneapolis	Koller, Robert L.	Minneapolis
† Johnson, John W.	Minneapolis	Koontz, Peter S.	Minneapolis
† Johnson, Norman P.	Minneapolis	† Koos, Gerald W.	Minneapolis
Johnson, Norman Paul	Minneapolis	Korchik, John P.	Minneapolis
† Johnson, Norton T.	Minneapolis	Koropchak, Nicholai	Minneapolis
† Johnson, Paul E.	Wayzata	† Kostich, Nikola D.	Minneapolis
Johnson, Phillip	Anoka	Kottke, Frederic J.	Minneapolis
† Johnson, Reinald G.	Minneapolis	† Koucky, Rudolph W.	Sagle, ID
† Johnson, Richard S.	Minneapolis	† Kovack, Freeman D.	Minneapolis
Johnson, Richard V.	Minneapolis	† Kozak, Michael J.	Minneapolis
† Johnson, Robert E.	Minneapolis	† Krafft, Walter E.	Minneapolis
† Johnson, Thomas H., Jr.	Minneapolis	† Kragh, Lyle V.	Minneapolis
Johnson, Youbert T.	Minneapolis	Kramer, Daniel W.	Minneapolis
† Johnston, Donald K.	Minneapolis	† Kremen, Arnold J.	Minneapolis
Jones, David G.	Minneapolis	Krieser, Albert E.	Minneapolis
†† Jones, Herbert W., Jr.	Minneapolis	Kronenberg, Richard S.	Minneapolis
† Jones, Richard H.	Minneapolis	Krystosek, Lee A.	Minneapolis
Jones, Thomas K., Jr.	Minneapolis	† Kucera, Frank J.	Hopkins
* Jordan, Donald V.	Minneapolis	† Kucera, William J.	Santa Barbara, CA
† Jorgensen, Harlan	Minneapolis	† Kump, Warren L.	Minneapolis
Judd, Allen S.	Minneapolis	Kuslich, Stephen D.	Burnsville
† Judd, Walter H.	Washington, DC	Kusz, Clarence V.	Minneapolis
† Jurdy, Mitchell J.	Minneapolis	† Kylo, John E.	Minneapolis
Kadesky, Harold B.	Minneapolis	† Kyllonen, Ronald R.	Edina
Kaiser, Harold B.	Minneapolis	L'Heureux, Philippe R.	Minneapolis
Kalb, Thomas J.	Minneapolis	† LaBree, John W.	Minneapolis
†† Kallestad, Leonard L.	Lauderdale-by-the-beach, FL	† Lagaard, Sheldon M.	Minneapolis
Kane, Dennis J.	Minneapolis	† Lai, Charles C. Y.	Minneapolis
Kane, Morton C.	Minneapolis	† Lajoie, John M.	Minneapolis
Kane, William J.	Chicago, IL	† Lamb, H. Douglas	Chattahoochee, FL
† Kaplan, Arnold P.	Minneapolis	† Landsman, Gordon S.	Minneapolis
† Kaplan, J. Jacob	Minneapolis	Lane, Jerald P.	Minneapolis
† Kaplan, Martin B.	Minneapolis	Lang, Leonard A.	Minneapolis
† Karleen, Conrad I.	Minneapolis	Langer, Leonard O., Jr.	Minneapolis
† Karlen, Markle	Minneapolis	† Lannon, James B.	Minneapolis
† Kasper, Robert E.	Minneapolis	†† Lapiere, Arthur P.	Minneapolis
† Katkov, Harold	Minneapolis	† Larsen, Frank W.	Minneapolis
Katz, Beni	Minneapolis	Larsen, Russel H.	Minneapolis
Katz, Harry I.	Minneapolis	† Larson, Allen K.	Minneapolis
Kaye, Dale R.	Minneapolis	† Larson, Arthur K.	Minneapolis
Kegel, James F.	Minneapolis	† Larson, Donald M.	Minneapolis
†† Kelby, Gert M.	Minneapolis	† Larson, Ernest J., Jr.	Minneapolis
Kelly, Charles F.	Minneapolis	† Larson, F. Wilmer	Minneapolis
† Kelly, John C.	Minneapolis	† Larson, Lawrence M.	Minneapolis
† Kelly, John P.	Minneapolis	Larson, Loren J.	Minneapolis
† Kelly, John T.	Robbinsdale	† Larson, Richard E.	Minneapolis
Kelly, William D.	Minneapolis	† Larson, Roger C.	Minneapolis
Kennedy, B. J.	Minneapolis	Larson, Stephen L.	Minneapolis
† Kennedy, Claude C.	Minneapolis	Larson, Wyllis G.	Minneapolis
† Khorsand, Darius	Minneapolis	Latts, Elliot M.	Minneapolis
† Kieffer, Stephen A.	Minneapolis	Lauritzen, Herbert	Minneapolis
Kim, Mark K.	St. Paul	† LaVake, Rae T.	Minneapolis
Kim, Suck Won	Minneapolis	† Lavender, Dick R.	St. Louis Park
Kimmel, George C.	Minneapolis	Lawrence, Van S.	Minneapolis
Kind, Allan C.	St. Louis Park	Lawrow, John W.	Minneapolis
† King, Frances W.	Minnetonka	Lawson, Warren R.	Minneapolis
† Kinney, William N.	Anoka	† Lawton, James J., Jr.	Minneapolis
† Kiser, Joseph C.	Minneapolis	Laxdal, Stefan D.	Minneapolis
Kjellsen, Douglas L.	Minneapolis	† Layer, James M.	Minneapolis
Klassen, Arthur C.	Minneapolis	Leavenworth, Richard O., Jr.	Minneapolis
† Kleven, Lowell H.	Minneapolis	Lee, Ju Hao	Minneapolis
† Knapp, Miland E.	Minneapolis	† Leemhuis, Andrew J.	Minneapolis
*†† Knight, Ralph T.	Minneapolis	† Lees, David C.	Minneapolis
† Knight, Ray R.	Minneapolis	† Leiferman, Robert J.	Minneapolis
† Knobloch, William H.	Minneapolis	Leighton, John S.	Minneapolis
Knowles, Richard A.	Coon Rapids	Leinonen, Wendla E.	Anok
Knudsen, Helen L.	Minneapolis	Lenz, Bernard W.	Minneapolis
* Kohlhasse, Robert E.	Minneapolis	Lenz, Oa	Minneapolis
Kolars, Charles P.	Minneapolis	Leonard, Samuel	Minneapolis
† Koller, Hermann M.	Minneapolis	Lerner, A. Ross	Minneapolis
		Leslee, Loren R.	Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

Leslie, W. Robert	Minneapolis	†‡	McInerny, Maurice W.	Minneapolis
Lester, Theodore H.	Minneapolis	†	McKelvey, John L.	St. Paul
Letson, Robert D.	Minneapolis		McKelvey, John M.	Minneapolis
† Levine, Howard M.	Minneapolis		McKenna, James L.	Minneapolis
Levine, Norman D.	Minneapolis	‡	McKenzie, Charles H.	Minneapolis
Levitt, Seymour H.	Minneapolis		McKhann, Charles F.	Minneapolis
Levy, Michael	Minneapolis		McKinlay, Gordon L.	Minneapolis
Lewis, F. Bruce	Minneapolis	‡	McKinley, C. Richard	Minneapolis
Lewis, Glenn M., Jr.	Minneapolis	†	McKinney, Frank S.	Minneapolis
† Lick, Louis C.	Minneapolis		McLaughlin, Byron H.	Minneapolis
Liebhaver, Henia F.	Minneapolis		McMahon, John E.	Minneapolis
Lillehei, James P.	Minneapolis		McNeil, John J.	Minneapolis
Lillehei, Richard C.	Minneapolis	‡	McParland, Felix A., Jr.	Minneapolis
Limbeck, Donald A.	Minneapolis	‡	McQuoid, David W.	Minneapolis
Lindall, Arnold W., Jr.	Minneapolis		MacCormick, Robert, Jr.	Minneapolis
Lindberg, Evan F.	Minneapolis	†‡	MacDonald, Daniel A.	Minneapolis
Lindberg, Vernon L.	Minneapolis	‡	MacGibbon, James D.	Minneapolis
Lindberg, Winston R.	Minneapolis	‡	MacKinnon, Donald C.	Minneapolis
Lindeland, Arthur T.	Minneapolis	†‡	Mach, Frank B.	Minneapolis
Lindemann, Charles E.	Minneapolis		Mach, John R.	Minneapolis
Linderholm, Bruce E.	Minneapolis		Macheleldt, Neil L.	Anoka
Lindgren, Russell C.	Minneapolis		Madireddi, Siuoranak	Osseo
Lindseth, Esten O.	Excelsior	‡	Madsen, Donald O.	Minneapolis
Linner, John H.	Minneapolis	‡	Maeder, Edward C.	Minneapolis
Linner, Paul W.	Minneapolis	‡	Maeder, Edward C., Jr.	Minneapolis
Lipschultz, Martin	St. Louis Park	‡	Magee, Timothy M.	Minneapolis
Lipschultz, Oscar	St. Louis Park		Mahan, Charles S.	Minneapolis
Litman, Abraham B.	Minneapolis		Mahmud, Kholid	Minneapolis
Litman, Thomas	Minneapolis	‡	Malmquist, Carl P.	Minneapolis
Lober, Paul H.	Minneapolis		Mandel, Sheldon L.	Minneapolis
Locke, Murray S.	Minneapolis		Manick, Kenneth P.	Minneapolis
Lofsness, Stanley V.	Minneapolis	‡	Mankey, James C.	Minneapolis
Loken, Merle K.	Minneapolis		Mann, George A.	Minneapolis
London, Nathaniel J.	Minneapolis	‡	Manoles, Elias N.	Minneapolis
Long, Donlin M.	Minneapolis		Manolis, Deane C.	Minneapolis
Lonstein, John E.	Minneapolis	‡	Mark, Aaron L.	Minneapolis
Lott, Frederick H.	Minneapolis	‡	Mark, Merle S.	Minneapolis
Lovett, Beatrice R.	Minnetonka		Mark, Peter M.	Minneapolis
Lowe, Douglas A.	Minneapolis	‡	Marking, George H.	Minneapolis
Lowry, Jeanette K.	Minneapolis	‡	Markland, Colin	Minneapolis
Lowry, Paul T.	Minneapolis		Markovitz, Jack M.	Minneapolis
Luckey, William T.	Minneapolis	‡	Marte, Egon	Minneapolis
Lueck, Wallace W.	Minneapolis		Marten, William E.	Minneapolis
† Lufkin, Nathaniel H.	Minneapolis	‡	Martin, Frank E.	Minneapolis
Lukinac, Charles J.	Minneapolis	‡	Martin, George R.	Minneapolis
Lund, George W.	Minneapolis	*	Martinson, Carl J.	Wayzata
Lund, Nancy R.	Minneapolis		Martinson, Elmer J.	Wayzata
Lund, Richard R.	Minneapolis	‡	Maslansky, Robert A.	Minneapolis
Lundblad, Rodger R.	Minneapolis	‡	Massee, Joseph S.	Minneapolis
Lundblad, Stanley W.	Minneapolis		Mastbaum, Leonard I.	Minneapolis
Lundeberg, Karl R.	Minneapolis		Mathog, Robert G.	Minneapolis
Lundquist, Charles B.	Minneapolis		Matthews, John A. G.	Minneapolis
Lundquist, Virgil J. P.	Minneapolis		Maunder, John B.	Minneapolis
Lynch, Michael F.	Minneapolis	†	Maxeiner, Stanley R.	Minneapolis
Lyon, Fred A.	Minneapolis	‡	Maxeiner, S. R., Jr.	Minneapolis
Lyon, John D.	Hopkins		Maxwell, Robert E.	Minneapolis
Lysne, Richard B.	Minneapolis		Mayberg, Donald M.	Minneapolis
Lysyj, Anatol	Minneapolis		Meany, Thomas J.	Minneapolis
Lyzenga, Anton G.	Minneapolis		Mears, Thomas U.	Minneapolis
McCaffrey, F. John	Minneapolis		Mecklenburg, Fred E.	Minneapolis
McC Campbell, Malcolm D.	Minneapolis	‡	Medina, Ambrosio M., Jr.	Wayzata
McCannel, Malcolm A.	Minneapolis		Meeker, Henry C.	Minneapolis
McCarthy, Donald	Minneapolis	‡	Meekin, Patrick C.	Minneapolis
McCollister, Robert J.	Minneapolis		Melichar, Paul J.	Minneapolis
McCormick, Donald P.	Minneapolis		Meller, Robert L.	Minneapolis
McDaniel, Orianna	Minneapolis		Mensheha, Nicholas M.	Minneapolis
McFarland, Arthur H.	Minneapolis	‡	Merner Thomas B.	Minneapolis
McGandy, Robert F.	Minneapolis	†	Merrick, Charlotte T.	St. Paul
McGovern, Lawrence	Minneapolis			

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COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

	Merrill, Daniel C.	Minneapolis		Nelson, Evan L. Jr.	Minneapolis
	Messenheimer, Myron G.	Minneapolis	‡	Nelson, Glen D.	Minneapolis
‡	Metz, Donald D.	Minneapolis	‡	Nelson, Gunard A.	Minneapolis
	Meyer, Alvin J.	Minneapolis	†	Nelson, Harvey	Deerfield Beach, FL
	Michael Alfred F.	Minneapolis	‡	Nelson, Lloyd S.	Minneapolis
†	Michel, Henry H.	Minneapolis	‡	Nelson, Maxine O.	Minneapolis
†	Mickelson, Emma F (Fronk)	Holmes Beach, FL	‡	Nelson, Maynard C.	Minneapolis
	Middlebrook, John E.	Minneapolis	‡	Nelson, O. L. Norman	Minneapolis
‡	Miller, H. Dawes	Minneapolis	‡	Nelson, Wallace I.	Minneapolis
‡	Miller, Harold E.	Minneapolis		Nemanich, George J.	Minneapolis
‡	Miller, Hugo E.	Minneapolis		Nerenberg, Sidney	Minneapolis
	Miller, J. Carleton	Minneapolis	‡	Nesse, Anton S.	Minneapolis
	Miller, Kenneth	Apple Valley	‡	Nesset, Lawren B.	Minneapolis
	Miller, William P.	Minneapolis	‡	Nesset, William D.	Minneapolis
‡	Millett, D. Keith	Minneapolis		Neumann, Roland F.	Minneapolis
	Milroy, Thomas W.	Fridley	‡	Neumeister, Charles A.	Minneapolis
‡	Minder, John G.	Minneapolis		Neuwirth, Gerardo D.	Golden Valle
	Mindrum, Gerald G.	Minneapolis		Nicholas, S. Scott, Jr.	Minneapolis
	Minsky, Armen A.	Minneapolis		Nichols, Robert T.	Minneapolis
‡	Mitby, Irvin L.	Minneapolis		Nicolette, Charles C.	Minneapolis
‡	Mitchell, Berton D.	Minneapolis	‡	Nielsen, David J.	Minneapolis
	Mitchell, Edward C.	College Place, WA	‡	Nilsen, John A.	Minneapolis
‡	Mitchell, Mancel T.	Minneapolis		Nivatvonges, Sathat	Minneapolis
‡	Mixer, Harry W.	Minneapolis		Nolan, Robert K.	Brooklyn Cente
	Moe, John H.	Minneapolis	‡	Noran, Harold H.	Minneapolis
‡	Moe, W. Wyatt	Minneapolis		Norberg, William J.	Fridley
‡	Moehn, John T.	Minneapolis	‡	Nord, Robert E.	Minneapolis
†	Moen, Johannes K.	Minneapolis	£	Nordlie, Paul E.	Minneapolis
	Moghaddam, Alaeddin	Minneapolis	‡	Norman, Franklin C.	Minneapolis
‡	Monson, Einer M.	Minneapolis	‡	Norman, Mark L., Jr.	Minneapolis
	Monson, Paul S.	Minneapolis		Norval, Mildred A.	Minneapolis
	Monson, Warren A.	Minneapolis	‡	Nuessle, William F.	Minneapolis
‡	Moody, David L.	Minneapolis	‡	Nydahl, Bruce C.	Minneapolis
†	Moore, Irvin H.	Eden Prairie	†‡	Nydahl, Malvin J.	Minneapolis
	Moorhead, Marie	Minneapolis	‡	O'Brien, Bruce J.	Minneapolis
	Moos, Daniel J.	Minneapolis	‡	O'Brien, William A.	Minneapolis
‡	Mork, A. Harold	Anoka	†	O'Donnell, James E.	Minneapolis
‡	Mork, Frank E.	Anoka		O'Leary, John B.	Minneapolis
‡	Mork, Frank E., Jr.	Minneapolis		O'Neil, Bernerd L.	Minneapolis
	Moss, Nyel H.	Minneapolis	‡	O'Hanlon, William J.	Minneapolis
‡	Mosser, Donn G.	Minneapolis		O'Phelan, E. Harvey	Minneapolis
	Mossman, Philip L.	Minneapolis		Officer, Charles D.	Burnsville
‡	Moyer, Leonard B.	Minneapolis		Ohmann, Ronald J.	Minneapolis
‡	Mueller, James M.	Minneapolis		Olavs, Olga	Minneapolis
‡	Mulholland, William M.	Minneapolis	‡	Olfelt, Paul C.	Minneapolis
‡	Mullin, Gerald T., Jr.	Minneapolis	†	Olsen, E. George	Minnetonk
‡	Mulvahill, John E.	Minneapolis		Olsen, Jay R.	Minneapolis
‡	Munkittrick, Ronald C.	Minneapolis	‡	Olson, Alton C.	Minneapolis
	Murray, Charles L.	Minneapolis		Olson, C. Kent	Minneapolis
†	Murray, Elisabeth M.	Minneapolis		Olson, Carl J.	Minneapolis
‡	Muschenheim, Frederick	Minneapolis	‡	Olson, Detlof M.	Minneapolis
‡	Muske, Marvin M.	Minneapolis	‡	Olson, Duane C.	Minneapolis
‡	Musty, Nicholas J.	Minneapolis	‡	Olson, Hardin E.	Minneapolis
†	Myers, Jay A.	Minneapolis	†	Olson, Olof A.	Minneapolis
‡	Myhre, James	Minneapolis	‡	Olson, Philip A.	Minneapolis
	Mylrea, Murray J.	Burnsville	‡	Olson, Robert A.	Minneapolis
	Nagobads, Ilgvars J.	Minneapolis		Olson, Robert E.	Minneapolis
	Nagobads, V. George	Minneapolis		Olson, Robert W.	Minneapolis
‡	Najarian, John S.	Minneapolis		Olson, Rolland A.	Wayzata
	Nash, Eldore B.	Minneapolis	‡	Opheim, Richard H.	Minneapolis
	Nathenson, Aaron L.	Minneapolis	‡	Oppen, E. Gerhard	Minneapolis
†‡	Neal, Joe M.	Minneapolis		Oppen, Melvin G.	Minnetonk
	Neal, Robert R., Jr.	Minneapolis		Opstad, Earl T.	Minneapolis
†	Nelson, Bernice A.	Minneapolis	‡	Orbuch, Martin W.	Minneapolis
†	Nelson, C. Barton	Minneapolis	‡	Orkin, Milton	Minneapolis
	Nelson, Carleton A.	Minneapolis		Orn, Duane L.	Minneapolis
£	Nelson, David W.	Minneapolis		Osterberg, Kenneth A.	Minneapolis
‡	Nelson, Edward N.	Minneapolis		Ostrov, Charles S.	Minneapolis
				Ott, Eugene C.	Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

Owen, Richard R.	Minneapolis	‡	Quello, Robert O. B.	Minneapolis
Paal, Dwain J.	Minneapolis		Quick, Cedric A.	Minneapolis
Page, Raymond L.	St. Paul		Quiggle, Arthur B.	Minneapolis
Paisner, Hyman M.	Minneapolis		Quist, Henry W., Jr.	Minneapolis
Palen, Benjamin J.	Scottsdale, AZ		Raab, David E.	Minneapolis
Palm, E. Theodore	Minneapolis		Racer, Harley J.	Minneapolis
Paparella, Michael M.	Minneapolis		Ragan, John J.	Minneapolis
Papermaster, Ralph	Minneapolis	‡	Raich, John J.	Minneapolis
Papermaster, Theodore C.	St. Louis Park		Raile, Richard B.	Minneapolis
Park, Wilford E.	Minneapolis	‡	Randall, David A.	Minneapolis
Parod, John D.	Minneapolis		Randall, Phillip S.	Minneapolis
Parrott, John C.	Minneapolis		Ranheim, Phillip J.	Minneapolis
Pattee, James J.	Minneapolis	‡	Ratelle, Alexander E.	Minneapolis
Patterson, Paul G.	Minneapolis		Recht, Thomas M.	Minneapolis
Paule, William J.	Minneapolis	‡	Reece, Richard L.	Minneapolis
Peiper, Warren S.	Minneapolis	‡	Reed, John H., Jr.	Minneapolis
Peluso, Charles R.	Minneapolis		Reed, Sheldon C.	Minneapolis
Pennington, Mary	Minneapolis	‡	Regan, John J.	Minneapolis
Peper, Martin C.	Minneapolis		Rehmann, Ronald E.	Coon Rapids
Perlman, Everett C.	Minneapolis	‡	Reichel, Samuel M.	Minneapolis
Perlman, Herschel L.	St. Louis Park	‡	Reif, Harold A.	Minneapolis
Peteler, Jennings C. L.	Minneapolis	‡	Reiley, Richard E.	Minneapolis
Petersen, Byron D.	Minneapolis	‡	Reinhart, Richard O.	Minneapolis
Petersen, Deane A.	Minneapolis		Reisdorf, George E.	St. Louis Park
Petersen, Glenn L.	Minneapolis	‡	Reiser, Milton P.	Minneapolis
Petersen, William E.	Minneapolis	‡	Remole, William D.	Minneapolis
Peterson, Charles A.	Minneapolis		Resch, Joseph A.	Minneapolis
Peterson, Charles R.	Minneapolis		Reul, Thomas W.	Minneapolis
Peterson, John A.	Minneapolis	£	Reynolds, James	Minneapolis
Peterson, Oliver H., Jr.	Minneapolis		Rhodes, Clinton E.	Minneapolis
Peterson, Palmer A.	Minneapolis	‡	Rholl, Arnold O.	Minneapolis
Peterson, Rodney H.	Minneapolis		Rice, Carl O.	Minneapolis
Peterson, Theodore A.	Minneapolis		Rice, Edwin G.	Minneapolis
Peterson, Willard C., Jr.	Minneapolis	‡	Rice, Fred A.	Minneapolis
Petit, Julien V.	Minneapolis	‡	Richardson, Robert J.	Minneapolis
Petit, Leon J.	Minneapolis	‡	Richdorf, Lawrence F.	Minneapolis
Pewters, John T.	Minneapolis	‡	Rierson, Phillip A.	Minneapolis
Pfohl, Richard A.	Minneapolis		Riley, John D.	Minneapolis
Phelps, Kenneth A.	Palo Alto, CA		Riordan, Elsie M.	Minneapolis
Phelps, Robert D.	Minneapolis	‡	Ripple, Rudolph J., Jr.	Minneapolis
Phibbs, Clifford M., Jr.	Minneapolis		Risch, Ronald E.	Minneapolis
Pilling, Loran F.	Minneapolis		Rizer, Dean K.	Minneapolis
Pincus, Mitchell	Minneapolis	‡	Robb, Edwin F.	Boca Raton, FL
Pizarro, Remi L.	Minneapolis	*‡	Robbins, Owen F.	Minneapolis
Plasha, Matthew K.	Coon Rapids		Roberts, Byron H.	Minneapolis
Plass, Herbert F. R.	Minneapolis	‡	Roberts, Lewis J.	Minneapolis
Pleissner, Karl W.	Minneapolis		Robinson, Cortland O.	Minneapolis
Plimpton, Nathan C.	Minneapolis	‡	Rock, William H.	Anoka
Pohl, John F.	Minneapolis		Rocknem, Robert E.	Minneapolis
Poland, Jerome D.	Minneapolis	‡	Rockwell, Curtiss V.	Minneapolis
Polesky, Herbert F.	Minneapolis		Rodgers, Richard S.	Minneapolis
Poley, Brooks J.	Minneapolis	‡	Rogin, Norton	Minneapolis
Poljack, Stuart J.	Minneapolis	£	Rohrmann, Charles A., Jr.	Minneapolis
Pollak, Kurt	Minneapolis		Rollins, Pat	Minnetonka
Pollock, Anthony J.	Minneapolis		Romness, Kenneth B.	Mound
Polzak, James A.	Roseville	‡	Rosenbaum, David L.	Minneapolis
Pone, John J.	Minneapolis	‡	Rosendahl, Frederick G.	Minneapolis
Popadiuk, Peter	Minneapolis	‡	Rosenfield, Abraham B.	Minneapolis
Popowich, John G.	Minneapolis	‡	Rosenow, John H.	Minneapolis
Poppe, Frederick H.	Miami, FL		Rosenquist, Rudolph J.	Minneapolis
Potter, Robert B.	Minneapolis	‡‡	Rosenstein, Hanan J.	Minneapolis
Pratt, Fred J.	Minneapolis	‡	Rosenwald, Reuben M.	Anoka
Prem, Konald A.	Minneapolis	‡	Rossen, Ralph	Minneapolis
Preston, Frank S., Jr.	Minneapolis		Rotenberg, Robert J.	Minneapolis
Price, William E.	Minneapolis	‡	Rothnem, Morris S.	Minneapolis
Prickman, William E.	Minneapolis		Rubin, Manly	Minneapolis
Probstfield, Jeffrey L.	Minneapolis	‡	Rucker, Thomas K.	Minneapolis
Priest, Robert E.	Minneapolis	‡	Rucker, William H.	Minneapolis
Proshek, Lumir C.	Minneapolis	‡	Rud, Norman E.	Edina

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡ Ruiz, ErnestMinneapolis
‡ Russeth, Arthur N.Minneapolis
†‡ Rusten, Elmer M.Minneapolis
Rydberg, John S.Minneapolis
Rydland, Arne D.Minneapolis
St. Cyr, Harry M.Minneapolis
St. Cyr, Kenneth J.Minneapolis
‡ Salchert, John J.Minneapolis
Saliterman, Bernard I.Minneapolis
‡ Salovich, Edward L.Minneapolis
‡ Salovich, Elmer R.Minneapolis
Sanchez, Jose S.W. St. Paul
‡ Sandt, Karl E.Minneapolis
Sanfilippo, Sylvester J.Minneapolis
Sartor, RichardMinneapolis
Sawyer, Glen T.Minneapolis
Sayther, Keith D.Minneapolis
‡ Sborov, Abe M.Minneapolis
Scallen, Raymond W.Minneapolis
‡ Scanlan, Patrick J.Minneapolis
Schaar, Frances E.Minneapolis
† Schaefer, Wesley G.Minneapolis
Schaffhausen, Irwin F.Minneapolis
Schaffhausen, MildredMinneapolis
‡ Scherer, L. RaymondMinneapolis
Scherling, Sidney S.Minneapolis
Schiele, Burtrum C.Minneapolis
Schiller, Philip J.Minneapolis
Schissel, Gregory A.Washington, D.C.
‡ Schissel, Richard C.Minneapolis
Schmidt, W. RobertMinneapolis
† Schmitt, Samuel C.Fallbrook, CA
Schneck, Jack I.Minneapolis
Schoening, Herbert A.Minneapolis
Schoenwetter, William F.Minneapolis
‡ Schottler, Jerry L.Minneapolis
Schottler, Max E.Minneapolis
‡ Schroeder, Albert J.Minneapolis
‡ Schultz, AlanMinneapolis
Schultz, Alvin L.Minneapolis
‡ Schultz, J. HaroldMinneapolis
‡ Schultz, Peter J.Minneapolis
Schultz, Robert J.Minneapolis
Schulze, William M.Minneapolis
‡ Schumacher, John W.Minneapolis
‡ Schumacher, Robert V.Minneapolis
‡ Schut, Lawrence J.Minneapolis
Schwartz, E. RobertMinneapolis
Sciarra, John J.Minneapolis
‡ Scott, Horace G.Minneapolis
‡ Scott, Robert H.Minneapolis
Scott, William R.Minneapolis
† Seaberg, John A.Pequot Lakes
Seay, James E., IIIMinneapolis
Segal, Edward L.Minneapolis
Segal, Martin A.Minneapolis
Segal, Marvin S.Minneapolis
‡ Segal, Sheldon J.Minneapolis
† Seham, MaxSt. Paul
Seifert, Gregory L.Minneapolis
‡ Seifert, Milton H., Jr.Excelsior
‡ Seljeskog, Edward L.Minneapolis
Semba, ThomasMinneapolis
‡ Semsch, Robert D.Wayzata
Severseike, Odean M.Minneapolis
‡ Seymour, John L.Minneapolis
Shackelford, Terry C.Minneapolis
Shah, Popatial S.Osseo
‡ Shandorf, James F.Minneapolis
Shanks, James R.Minneapolis

† Shaperman, Eva P.San Diego, CA
Shapiro, IrvingMinneapolis
Shapiro, Sidney K.Minneapolis
‡ Shapiro, Stanley W.Minneapolis
‡ Shattuck, Clark A.Minneapolis
‡ Shaw, Howard A.Minneapolis
Shea, Andrew W.Minneapolis
‡ Shemesh, AlvinMinneapolis
‡ Sher, LewisMinneapolis
‡ Sherman, Lloyd F.Minneapolis
† Shillington, Maurice A.Ft. Lauderdale, FL
Sholler, Lawrence J.Minneapolis
Shragg, Robert I.Minneapolis
Shronts, John S.Minneapolis
Shronts, John F.Minneapolis
Sidell, Franklin D.Minneapolis
Siebert, Richard C.Minneapolis
Siegmann, William C.Minneapolis
Sigel, Melvin E.Minneapolis
‡ Silas, Ralph M.Minneapolis
Silver, John D.Minneapolis
‡ Silverstein, Paul M.Minneapolis
‡ Simmons, Richard K.Minneapolis
Simmons, Richard L.Minneapolis
Simo, Kathleen KayMinneapolis
‡ Simonson, Donald B.Minneapolis
Simso, Lee A.Minneapolis
Singher, Lawrence J.Minneapolis
‡ Sinykin, Melvin B.Minneapolis
Sipe, James W.Coon Rapids
‡ Skjold, Arthur C.Minneapolis
‡ Sletten, Richard G.Minneapolis
‡ Slosser, Gaius, J., IIMinneapolis
Smeby, Loren A.Minneapolis
Smiley, John T.Minneapolis
†‡ Smisek, Frank M.Minneapolis
† Smith, Adam M.Minneapolis
‡ Smith, Archie M.Minneapolis
Smith, BarlowMinneapolis
‡ Smith, Baxter A., Jr.Minneapolis
‡ Smith, Graham G.Minneapolis
Smith, Henry T.Minneapolis
‡ Smith, John E.Minneapolis
Smith, Nadine G.Minneapolis
‡ Smith, Theodore S.Minneapolis
‡ Soderberg, Richard J.Minneapolis
†‡ Soderlind, Ragnar T.Minneapolis
‡ Soiset, Robert P.Minneapolis
‡ Solhaug, Samuel B., Jr.Minneapolis
Soll, Robert W.Minneapolis
Solvason, Harold M.Minneapolis
‡ Spano, Joseph P.Minneapolis
‡ Spencer, Bernard J.Minneapolis
Spencer, David L.Minneapolis
Spenny, Edward A. L.Minneapolis
Spink, Wesley W.Minneapolis
‡ Sponsel, Kenath H.Minneapolis
‡ Stahr, Aubrey C.Hopkins
Standefer, James E.Minneapolis
† Stanford, Charles E.Waupun
‡ Steidl, Richard M.Minneapolis
†‡ Stelter, Lloyd A.Minneapolis
† Stenstrom, Annette T.Grand Marais
Stenzel, Donald A.Minneapolis
Stenzel, Joseph A.Minneapolis
Stephens, William E.Minneapolis
Sterrie, Norman A.Minneapolis
Stevens, Sheridan S. H.Minneapolis
Stewart, Marvin J.Minneapolis
‡ Stiegler, Farrell S.Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡	Stillman, M. Thomas	Rochester
‡	Stoltz, Robert C.	Minneapolis
‡	Stone, Norman F.	Minneapolis
‡	Stone, Stanley P.	Minneapolis
‡	Strait, Herbert S.	Minneapolis
‡	Strand, Clarence M.	Minneapolis
‡	Strand, Peter J.	Minneapolis
†	Strand, Richard C.	Bloomington
‡	Streu, Richard E.	Minneapolis
‡	Strickler, Jacob H.	Minneapolis
§	Stringer, Gene C.	Minneapolis
‡	Strobel, Jack L.	Minneapolis
‡	Strom, Gordon W.	Minneapolis
‡	Strom, Robert L.	Minneapolis
‡	Stromgren, Delph T.	Minneapolis
‡	Stromme, William B.	Minneapolis
‡	Strunk, Clarence A.	Minneapolis
‡	Student, Richard E.	Minneapolis
‡	Sturges, Robert L.	Minneapolis
‡	Subak, Barbara H.	Minneapolis
‡	Subby, Walter	Minneapolis
‡	Sukov, Marvin	Minneapolis
‡	Sulciner, Aurel	Minnetonka
‡	Sundberg, A. Bruce	Minneapolis
‡	Sutherland, John E.	Minneapolis
‡	Swaiman, Kenneth F.	Minneapolis
‡	Swallen, Thomas O.	Minneapolis
‡	Swanson, David A.	Minneapolis
‡	Swanson, Gerald E.	Minneapolis
‡	Swanson, John O.	Minneapolis
#	Swanson, Wallace L.	Quito, Ecuador
†‡	Sweetser, Horatio B.	Minneapolis
‡	Sweetser, Theodore H., Jr.	Minneapolis
‡	Swendseen, Carl J.	Minneapolis
‡	Swenson, Floyd J.	Minneapolis
‡	Swenson, James D.	Minneapolis
‡	Swenson, Richard W.	Minneapolis
‡	Swift, Dean C.	Minneapolis
‡	Symchych, Boris E.	Minneapolis
‡	Tam, Ernest C.	Minneapolis
‡	Tambornino, Joseph M.	Minneapolis
‡	Tanaka, Shin	Minneapolis
‡	Tangen, George V.	Minneapolis
†	Taylor, Joseph H.	Ft. Lauderdale, FL
‡	Tchou, Mien-Fa	Minneapolis
‡	Telander, Robert L.	Minneapolis
‡	tenBensel, Robert W.	Minneapolis
‡	Tenner, Robert J.	Minneapolis
‡	Teska, Byron A.	Minneapolis
‡	Teynor, Joseph W.	Minneapolis
‡	Tharp, Ralph	Minneapolis
‡	Thelemann, Arthur R., Jr.	Minneapolis
‡	Theobalt, Inge M.	Minneapolis
‡	Theologides, Anthanasios	Minneapolis
‡	Thomasson, Robert D.	Minneapolis
‡	Thomas, A. Boyd	Minneapolis
‡	Thompson, Arthur	Minneapolis
‡	Thorson, Stuart V.	Minneapolis
‡	Thysell, Desmond M.	Minneapolis
‡	Tierney, Jon P.	Minneapolis
‡	Titrud, Leonard A.	Minneapolis
‡	Tobin, John A.	Minneapolis
‡	Tobin, John D.	Minneapolis
‡	Torp, William B.	Minneapolis
‡	Torres, Fernando	Minneapolis
‡	Town, Louise A.	Minneapolis
‡	Townes, C. Dwight, Jr.	Minneapolis
‡	Trach, Benedict B.	Minneapolis
‡	Trost, Francis J.	Minneapolis
‡	Trow, James E.	Minneapolis

	Tsai, Shih Hao	Minnetonka
‡	Tucker, Richard C.	Minneapolis
	Tudor, Richard B.	Minneapolis
£	Tully, Timothy E.	Minneapolis
	Turbak, Charles E.	Minneapolis
‡	Turkbias, Nejat	Minneapolis
‡	Twidwell, Joseph E.	Minneapolis
#	Ulrich, Wesley D.	Maftaq, Jordan
‡	Ulvestad, Harold S.	Minneapolis
	Umana, C. Robert	Minneapolis
‡	Utendorfer, Robert W.	Minneapolis
‡	Vaaler, Robert T.	Minneapolis
‡	Valgemae, Romil	Minneapolis
	Van Oppen, Dirk J. A.	Minneapolis
	Van Tassel, Robert A.	Minneapolis
	Vellek, Donald G.	Minneapolis
	Verby, John E.	Minneapolis
	Vik, A. Elliott	Minneapolis
	Vilaseca, Louis B.	Minneapolis
‡	Villella, Ronald L.	Minneapolis
‡	Von Drashek, Stanley C.	Minneapolis
	von Weiss, David L.	Minneapolis
	Vorlicky, Loren N.	Minneapolis
	Waschle, Richard K.	Minneapolis
	Wagner, Christian J.	Minneapolis
‡	Wagner, Robert M.	Minneapolis
†	Waldron, Carl W.	Scottsdale, AZ
‡	Waldron, John F.	Minneapolis
	Walker, Fredric E., Jr.	Minneapolis
	Wall, Carl R.	Grand Marais
‡	Wallinga, Jack V.	Minneapolis
†	Walonick, Albert L.	Minneapolis
	Walsh, John G.	Minneapolis
	Wang, Josef K.	Minneapolis
	Wang, Yang	Minneapolis
†	Wangensteen, Owen H.	Minneapolis
‡	Warren, John W.	Minneapolis
‡	Watson, C. Gordon	Minneapolis
	Watson, Cecil J.	Minneapolis
	Wattenberg, Lee W.	Minneapolis
‡	Weatherhead, D. Stuart P.	Minneapolis
	Webber, Richard J.	Minneapolis
‡	Weber, Lowell W.	Minneapolis
#	Wegleitner, Mark J.	El Paso, TX
	Weisberg, Martin G.	Minneapolis
	Weisberg, Rapheal J.	Minneapolis
	Weisberg, Stephen C.	Minneapolis
	Weisel, Mary R.	Minneapolis
‡	Wendland, John P.	Minneapolis
	Wengler, Robert A.	Minneapolis
£	Werges, Thomas M.	Minneapolis
	Werner, George	Minneapolis
‡	Wesolowski, Stanley	Minneapolis
†	West, Catherine C.	Edina
	Wester, Mary Sue	Minneapolis
	Westgate, Hugh D.	Minnetonka
	Westreich, Gilbert	Minneapolis
†	Wetherby, Macnider	Minneapolis
	Whittington, Joseph F.	Coon Rapids
	Wett, Richard J.	Minneapolis
	Wexler, Harold M.	Minneapolis
‡	Wheeler, Robert W.	Minneapolis
	Whitacre, John C., II	Minneapolis
	White, Asher A.	Minneapolis
†	White, Willard D.	Edina
	Whitesell, Lloyd A.	Minneapolis
	Wicklund, Paul E.	Wayzata
‡	Widen, Wilford F.	Minneapolis
	Wigdahl, Lowell C.	Minneapolis
‡	Wigdahl, Luther O.	Minneapolis

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COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡ Wilcox, William A.	Minneapolis	Woodley, Donald W.	Minneapolis
‡ Wild, John J.	Minneapolis	‡ Worrell, Philip J.	Minneapolis
† Wilder, Russell M., Jr.	Topeka, KS	‡ Woyda, William C.	Minneapolis
‡ Wilder, Walter L.	Minneapolis	Wright, Donald L.	Minneapolis
†‡ Wilken, Paul A.	Minneapolis	Wright, Francis S.	Minneapolis
† Williams, Henry L.	West St. Paul	Wright, William S.	Minneapolis
‡ Williams, Paul A.	Minneapolis	Wuest, Frederick C.	Wayzata
Williams, Richard E.	Robbinsdale	† Wynne, Herbert M. N.	Wayland, MA
Wilson, John A.	Minneapolis	Yeager, Terrell F.	Anoka
‡ Wilson, Robert E.	Minneapolis	Yelle, Matthew D.	Anoka
‡ Wilson, Thomas M., Jr.	Minneapolis	†‡ Ylvisaker, Ragnvald S.	Minneapolis
Winchell, Paul	Minneapolis	Yonehiro, Earl G.	Minneapolis
Winter, Laurence E.	Minneapolis	Young, Ronald C.	Minneapolis
† Winther, Nora M. C.	Columbus, OH	Yue, Alexander	Minneapolis
‡ Wippermann, Frederic F.	Minneapolis	Yue, Wen Y.	Excelsior
Wisio, Erich S.	Minneapolis	Zahrendt, O. Lewis	Minneapolis
Wisness, Osmund A.	Savage	Zak, Solomon J.	Minneapolis
Woellner, Richard C.	Minneapolis	Zarling, U. Richard	Minneapolis
†‡ Wohlrabe, Arthur A.	Minneapolis	‡ Zaworski, Leo A.	Minneapolis
‡ Wohlrabe, Robert G.	Minneapolis	‡ Zelikson, Alvin S.	Minneapolis
‡ Wolter, Frederick H.	Minneapolis	† Zierold, Arthur A.	Minneapolis
Wong, Edward T.	Minneapolis	Zimering, Sakina	Minneapolis
Wong, Freeman E.	Minneapolis	‡ Zinn, Charles W.	Wayzata
£ Wong, Howard H.	Bloomington	‡ Zinter, Ferdinand A.	Minneapolis
Woodbury, John W.	Minneapolis		

LYON-LINCOLN COUNTY MEDICAL SOCIETY

Lyon and Lincoln Counties
Regular meetings, 6 meetings—Spring and Fall
Annual meeting, November
Number of members 25

PRESIDENT

Panning, W. P. Marshall

SECRETARY

Kaczowski, William Marshall
‡ Bosley, Patrick Balaton
‡ Eckdale, John E. Marshall
‡ Hedenstrom, Philip C. Marshall
†‡ Johnson, C. Percy Tyler
‡ Kaczowski, William Marshall
† Kreuzer, Titus C. New Brighton
Lee, Norman J. Tracy
Magtibay, Meynardo B. Tyler
‡ Monson, Leonard J. Canby
‡ Mueller, LeRoy E. Hendricks

‡ Mulder, Richard D. Ivanhoe
‡ Murphy, Joseph E. Marshall
‡ Myers, John W. Canby
‡ Odland, Olin M. Marshall
‡ Olson, Robert T. Canby
‡ Panning, Wayne P. Marshall
‡ Peterson, Kenneth A. Marshall
† Rohrer, Christian A. Madison Lake
Schroepfel, Robert O. Tracy
‡ Stover, Laddie E. Marshall
‡ Taintor, Ronald W. Marshall
Tan, Ruby Marshall
‡ Thompson, Carl O. Hendricks
† Workman, Warner G. Tracy
† Yaeger, Wilbert W. Torrance, CA

McLEOD COUNTY MEDICAL SOCIETY

McLeod County
Regular meetings, third Thursday of each month
Annual meeting, November
Number of members 15

PRESIDENT

Jensen, Alvin M. Brownton

SECRETARY

Smyth, John J. Lester Prairie
‡ Bretzke, Carl O. Hutchinson
‡ Close, Gerald A. Glencoe
Griebie, Grant L. Hutchinson
Hegrenes, Robert L. Hutchinson
‡ Huebert, Dan W. Hutchinson
‡ Jensen, Alvin M. Brownton

Ketola, Tauno E. Glencoe
‡ Kleinkauf, Thomas P. Hutchinson
McNeil, Maurice R. Glencoe
Navratil, Donald R. Glencoe
‡ Peterson, Kenneth H. Hutchinson
* Selmo, Joseph D. Norwood
‡ Smith, George R. Hutchinson
‡ Smyth, John J. Lester Prairie
‡ Stifter, A. J. Winsted
‡ Truesdale, Clark W. Glencoe

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

Hall, Fredric C.	Minneapolis	†	Hodges, Kenneth V.	Minneapolis
† Hall, Harry B.	Minneapolis	†	Hoffert, Henry F.	Minneapolis
† Hall, Loren J.	Minneapolis		Hoffman, Neil R.	Minneapolis
† Hall, Wendell H.	Minneapolis	†	Hoffman, Roy A.	Minneapolis
Hambidge, Gove, Jr.	Minneapolis	†	Hoffman, Walter Lees	Minneapolis
Hamel, Arnold L.	Minneapolis	†	† Hofmann, Gerald N.	Minneapolis
† Hamel, Joseph I.	Minneapolis	†	† Holm, Donald F.	Minneapolis
Hammerstrom, Robert N.	Minneapolis	†	† Holmberg, Conrad J.	Minneapolis
† Handler, Seymour	Minneapolis	†	Holzapfel, Fred C.	Minneapolis
† Hanisch, Edward C., Jr.	Minneapolis	†	† Hopperstad, J. Jerome	Minneapolis
†† Hansen, Cyrus O.	Minneapolis	†	† Hoppes, Emerson E.	Minneapolis
†† Hansen, Erling W.	Minnetonka	†	† Horecki, Henry	Minneapolis
† Hansen, Olga S.	Minneapolis	†	Horns, Howard L.	Minneapolis
† Hansen, Rollin M.	Minneapolis	†	† Horns, Norman	Minneapolis
† Hanske, Edward A.	Minneapolis	†	† Horns, Richard C.	Minneapolis
Hanson, A. Stuart	Minneapolis		Horowitz, Arthur J.	Minneapolis
† Hanson, Harlow J.	Minneapolis		Hoseth, Wayne L.	Minneapolis
Hanson, Harold B.	Burnsville	†	Hosfield, William B.	Minneapolis
† Hanson, Harold W.	Minneapolis	†	† House, James H.	Minneapolis
† Hanson, Mark C. L.	Minneapolis	†	† Householder, James R.	Minneapolis
Hanson, Mildred S.	Minneapolis		Hovland, Melvin L.	Minneapolis
† Hanson, Stephen L.	Minneapolis	†	† Hovland, Richard D.	Minneapolis
† Hanson, William A. H.	Minnetonka	£	† Howard, Richard J.	Edina
† Hanson, William	Minneapolis		Howard, Robert B.	Minneapolis
Harkness, John W.	Minneapolis		Howard, Solomon E.	Minneapolis
Harris, Leon D.	Bloomington	†	† Howell, Carter W.	Minneapolis
Harris, James D.	Minneapolis		Howell, John L.	Minneapolis
Hart, Terril H.	Wayzata	†	† Hoyt, C. Sherman	Minneapolis
† Hartig, Paul R.	Minneapolis	†	† Huff, John S.	Minneapolis
Hartman, Evelyn E.	Minneapolis	†	† Hulteng, Donald B.	Fridley
† Hartwig, John A.	Minneapolis		Hung, Jui-Sung	Minneapolis
Harty, Jerome L.	Fridley	†	† Hurr, Maland C.	Minneapolis
† Harvey, Clyde B.	Minneapolis	†	† Hustad, Edward G.	Minneapolis
† Hass, Frederick M.	Minneapolis	†	† Hymes, Alan C.	Minneapolis
† Hastings, Donald W.	Minneapolis	†	† Hymes, Charles	Minneapolis
Hauge, Erling T.	Minneapolis	†	† Idstrom, Linneus G.	Minneapolis
Haugen, George W.	Minneapolis	†	† Indeck, Walter	Minneapolis
Haugen, John A.	Minneapolis		Ingalls, Edgar G.	Minneapolis
Hauser, Donald C.	Minneapolis	†	† Iverslie, Phillip C.	Minneapolis
Havel, Robert J.	Minneapolis	†	Iverson, Eleanor B.	Minneapolis
Haven, Walter K.	Minneapolis	†	† Iverson, Rolf M.	Minneapolis
Hawkinson, Raymond P.	Minneapolis	†	† Jackson, J. Albert	Minneapolis
Hay, Lyle J.	Minneapolis	†	† Jackson, Richard L.	Minneapolis
Haywa, E. William	Minneapolis	†	† Jacobson, Leslie W.	Minneapolis
†† Head, Douglas P.	Minneapolis		† Jacobson, Loren J.	Minneapolis
Hebbel, Robert	Minneapolis		† Jacobson, Wyman E.	St. Louis Park
Hedrick, William L.	Minneapolis	†	† Jacoby, John S.	Minneapolis
Heinz, John N.	Minneapolis	†	† Jaffe, Manuel O.	Minneapolis
Heithoff, Kenneth B.	Bloomington	†	† Ide, Arthur W., Jr.	Minneapolis
Helgaas, Steffen A.	Farmington	†	† Janda, George W.	Minneapolis
Heller, Ben I.	Minneapolis		† Jarvis, Mary B.	Minneapolis
Heller, Steven A.	Minneapolis	†	† Jay, Alan R.	Temple, TX
Hempel, Dean J.	Minneapolis	†	† Jefferies, William L.	Minneapolis
Henrikson, Earl C.	Minneapolis	†	† Jensen, Nathan K.	Minneapolis
Herbert, Willis L.	Minneapolis	†	† Jensen, Paul A.	Minneapolis
Hess, Carroll N.	Minneapolis		† Jensen, Reynold A.	Minnetonka
Hess, Sheldon	Minneapolis		† Jerome, Bourne	Minneapolis
Heupel, Hermann W.	Minneapolis		† Jerome, Elizabeth B. K.	Minneapolis
Hewitt, Marshall I.	Minneapolis	†	† Jeub, Robert P.	Minneapolis
Hiatt, John A.	Minneapolis	†	† Johanson, James E.	Minneapolis
Hickok, David F.	Minneapolis		† Johnson, Alan R.	Minneapolis
Hiduchenko, Katherine	Minneapolis	†	† Johnson, Angelo G.	Minneapolis
Hildebrandt, Walter C.	Minneapolis	†	† Johnson, Arthur B.	Minneapolis
Hilgedick, William R.	Minneapolis		† Johnson, Bradley D.	Minneapolis
Hilgermann, George O.	Minneapolis		† Johnson, Curtis A.	Minneapolis
Hill, David L.	Minneapolis	†	† Johnson, David R.	Minneapolis
Hill, Earl	Minneapolis	†	† Johnson, Donald A.	Minneapolis
Hill, Elmer M.	Minneapolis	†	† Johnson, Edward A.	Minneapolis
Hiller, Bruce H.	Minneapolis	†	† Johnson, Frank E.	Minneapolis
Hitchcock, Claude R.	Minneapolis	†	† Johnson, Gordon E.	Minneapolis
		†	† Johnson, Harry A., Jr.	Minneapolis

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

†‡ Johnson, James A.Minneapolis
 ‡ Johnson, John W.Minneapolis
 ‡ Johnson, Norman P.Minneapolis
 Johnson, Norman PaulMinneapolis
 † Johnson, Norton T.Minneapolis
 ‡ Johnson, Paul E.Wayzata
 Johnson, PhillipAnoka
 ‡ Johnson, Reinald G.Minneapolis
 ‡ Johnson, Richard S.Minneapolis
 Johnson, Richard V.Minneapolis
 ‡ Johnson, Robert E.Minneapolis
 ‡ Johnson, Thomas H., Jr.Minneapolis
 Johnson, Youbert T.Minneapolis
 ‡ Johnston, Donald K.Minneapolis
 Jones, David G.Minneapolis
 ‡‡ Jones, Herbert W., Jr.Minneapolis
 ‡ Jones, Richard H.Minneapolis
 Jones, Thomas K., Jr.Minneapolis
 * Jordan, Donald V.Minneapolis
 ‡ Jorgensen, HarlanMinneapolis
 Judd, Allen S.Minneapolis
 ‡ Judd, Walter H.Washington, DC
 † Jurdy, Mitchell J.Minneapolis
 Kadesky, Harold B.Minneapolis
 Kaiser, Harold B.Minneapolis
 Kalb, Thomas J.Minneapolis
 ‡‡ Kallestad, Leonard L.Lauderdale-by-the-beach, FL
 Kane, Dennis J.Minneapolis
 Kane, Morton C.Minneapolis
 Kane, William J.Chicago, IL
 ‡ Kaplan, Arnold P.Minneapolis
 ‡ Kaplan, J. JacobMinneapolis
 ‡ Kaplan, Martin B.Minneapolis
 ‡ Karleen, Conrad I.Minneapolis
 ‡ Karlen, MarkleMinneapolis
 ‡ Kasper, Robert E.Minneapolis
 ‡ Katkov, HaroldMinneapolis
 Katz, BeniMinneapolis
 Katz, Harry I.Minneapolis
 Kaye, Dale R.Minneapolis
 Kegel, James F.Minneapolis
 ‡‡ Kelby, Gjert M.Minneapolis
 Kelly, Charles F.Minneapolis
 ‡ Kelly, John C.Minneapolis
 ‡ Kelly, John P.Minneapolis
 ‡ Kelly, John T.Robbinsdale
 Kelly, William D.Minneapolis
 Kennedy, B. J.Minneapolis
 † Kennedy, Claude C.Minneapolis
 ‡ Khorsand, DariusMinneapolis
 ‡ Kieffer, Stephen A.Minneapolis
 Kim, Mark K.St. Paul
 Kim, Suck WonMinneapolis
 Kimmel, George C.Minneapolis
 Kind, Allan C.St. Louis Park
 † King, Frances W.Minnetonka
 ‡ Kinney, William N.Anoka
 ‡ Kiser, Joseph C.Minneapolis
 Kjellsen, Douglas L.Minneapolis
 Klassen, Arthur C.Minneapolis
 ‡ Kleven, Lowell H.Minneapolis
 ‡ Knapp, Miland E.Minneapolis
 *†‡ Knight, Ralph T.Minneapolis
 † Knight, Ray R.Minneapolis
 ‡ Knobloch, William H.Minneapolis
 Knowles, Richard A.Coon Rapids
 Knudsen, Helen L.Minneapolis
 * Kohlhasse, Robert E.Minneapolis
 Kolars, Charles P.Minneapolis
 † Koller, Hermann M.Minneapolis

Koller, Robert L.Minneapolis
 Koontz, Peter S.Minneapolis
 ‡ Koos, Gerald W.Minneapolis
 Korchik, John P.Minneapolis
 Koropchak, NicholaiMinneapolis
 ‡ Kostich, Nikola D.Minneapolis
 Kottke, Frederic J.Minneapolis
 † Koucky, Rudolph W.Sagle, ID
 ‡ Kovack, Freeman D.Minneapolis
 ‡ Kozak, Michael J.Minneapolis
 ‡ Krafft, Walter E.Minneapolis
 ‡ Kragh, Lyle V.Minneapolis
 ‡ Kramer, Daniel W.Minneapolis
 ‡ Kremen, Arnold J.Minneapolis
 Krieser, Albert E.Minneapolis
 Kronenberg, Richard S.Minneapolis
 Krystosek, Lee A.Minneapolis
 † Kucera, Frank J.Hopkins
 † Kucera, William J.Santa Barbara, CA
 ‡ Kump, Warren L.Minneapolis
 Kuslich, Stephen D.Burnsville
 Kusz, Clarence V.Minneapolis
 ‡ Kylo, John E.Minneapolis
 ‡ Kyllonen, Ronald R.Edina
 L'Heureux, Philippe R.Minneapolis
 ‡ LaBree, John W.Minneapolis
 ‡ Lagaard, Sheldon M.Minneapolis
 ‡ Lai, Charles C. Y.Minneapolis
 † Lajoie, John M.Minneapolis
 ‡ Lamb, H. DouglasChattahoochee, FL
 ‡ Landsman, Gordon S.Minneapolis
 Lane, Jerald P.Minneapolis
 Lang, Leonard A.Minneapolis
 Langer, Leonard O., Jr.Minneapolis
 ‡ Lannon, James B.Minneapolis
 ‡‡ Lapierre, Arthur P.Minneapolis
 ‡ Larsen, Frank W.Minneapolis
 Larsen, Russel H.Minneapolis
 ‡ Larson, Allen K.Minneapolis
 Larson, Arthur K.Minneapolis
 ‡ Larson, Donald M.Minneapolis
 ‡ Larson, Ernest J., Jr.Minneapolis
 Larson, F. WilmerMinneapolis
 ‡ Larson, Lawrence M.Minneapolis
 Larson, Loren J.Minneapolis
 ‡ Larson, Richard E.Minneapolis
 ‡ Larson, Roger C.Minneapolis
 Larson Stephen L.Minneapolis
 Larson, Wyllis G.Minneapolis
 Latts, Elliot M.Minneapolis
 Lauritzen, HerbertMinneapolis
 † LaVake, Rae T.Minneapolis
 ‡ Lavender, Dick R.St. Louis Park
 Lawrence, Van S.Minneapolis
 Lawrow, John W.Minneapolis
 Lawson, Warren R.Minneapolis
 ‡ Lawton, James J., Jr.Minneapolis
 Laxdal, Stefan D.Minneapolis
 ‡ Layer, James M.Minneapolis
 Leavenworth, Richard O., Jr.Minneapolis
 Lee, Ju HaoMinneapolis
 ‡ Leemhuis, Andrew J.Minneapolis
 ‡ Lees, David C.Minneapolis
 ‡ Leiferman, Robert J.Minneapolis
 Leighton, John S.Minneapolis
 Leinonen, Wendla E.Anoka
 Lenz, Bernard W.Minneapolis
 Lenz, OaMinneapolis
 Leonard, SamuelMinneapolis
 Lerner, A. RossMinneapolis
 Leslee, Loren R.Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

Leslie, W. Robert	Minneapolis	†‡ McNerny, Maurice W.	Minneapolis
Lester, Theodore H.	Minneapolis	† McKelvey, John L.	St. Paul
Letson, Robert D.	Minneapolis	McKelvey, John M.	Minneapolis
† Levine, Howard M.	Minneapolis	McKenna, James L.	Minneapolis
Levine, Norman D.	Minneapolis	‡ McKenzie, Charles H.	Minneapolis
Levitt, Seymour H.	Minneapolis	McKhann, Charles F.	Minneapolis
Levy, Michael	Minneapolis	McKinlay, Gordon L.	Minneapolis
Lewis, F. Bruce	Minneapolis	‡ McKinley, C. Richard	Minneapolis
Lewis, Glenn M., Jr.	Minneapolis	† McKinney, Frank S.	Minneapolis
† Lick, Louis C.	Minneapolis	McLaughlin, Byron H.	Minneapolis
Liebhaver, Henia F.	Minneapolis	McMahon, John E.	Minneapolis
Lillehei, James P.	Minneapolis	McNeil, John J.	Minneapolis
Lillehei, Richard C.	Minneapolis	‡ McParland, Felix A., Jr.	Minneapolis
† Limbeck, Donald A.	Minneapolis	‡ McQuoid, David W.	Minneapolis
Lindall, Arnold W., Jr.	Minneapolis	MacCormick, Robert, Jr.	Minneapolis
Lindberg, Evan F.	Minneapolis	†‡ MacDonald, Daniel A.	Minneapolis
† Lindberg, Vernon L.	Minneapolis	‡ MacGibbon, James D.	Minneapolis
† Lindberg, Winston R.	Minneapolis	‡ MacKinnon, Donald C.	Minneapolis
† Lindeland, Arthur T.	Minneapolis	†‡ Mach, Frank B.	Minneapolis
† Lindemann, Charles E.	Minneapolis	Mach, John R.	Minneapolis
† Linderholm, Bruce E.	Minneapolis	Macheledt, Neil L.	Anoka
† Lindgren, Russell C.	Minneapolis	Madireddi, Siuoranak	Osseo
Lindseth, Esten O.	Excelsior	‡ Madsen, Donald O.	Minneapolis
† Linner, John H.	Minneapolis	‡ Maeder, Edward C.	Minneapolis
† Linner, Paul W.	Minneapolis	‡ Maeder, Edward C., Jr.	Minneapolis
Lipschultz, Martin	St. Louis Park	‡ Magee, Timothy M.	Minneapolis
Lipschultz, Oscar	St. Louis Park	Mahan, Charles S.	Minneapolis
Litman, Abraham B.	Minneapolis	Mahmud, Kholid	Minneapolis
† Litman, Thomas	Minneapolis	‡ Malmquist, Carl P.	Minneapolis
Lober, Paul H.	Minneapolis	Mandel, Sheldon L.	Minneapolis
† Locke, Murray S.	Minneapolis	Manick, Kenneth P.	Minneapolis
Lofsness, Stanley V.	Minneapolis	‡ Mankey, James C.	Minneapolis
Loken, Merle K.	Minneapolis	Mann, George A.	Minneapolis
London, Nathaniel J.	Minneapolis	‡ Manoles, Ellias N.	Minneapolis
† Long, Donlin M.	Minneapolis	Manolis, Deane C.	Minneapolis
Lonstein, John E.	Minneapolis	‡ Mark, Aaron L.	Minneapolis
Lott, Frederick H.	Minneapolis	‡ Mark, Merle S.	Minneapolis
† Lovett, Beatrice R.	Minnetonka	Mark, Peter M.	Minneapolis
Lowe, Douglas A.	Minneapolis	‡ Marking, George H.	Minneapolis
Lowry, Jeanette K.	Minneapolis	‡ Markland, Colin	Minneapolis
Lowry, Paul T.	Minneapolis	Markovitz, Jack M.	Minneapolis
† Luckey, William T.	Minneapolis	‡ Marte, Egon	Minneapolis
Lueck, Wallace W.	Minneapolis	Marten, William E.	Minneapolis
†‡ Lufkin, Nathaniel H.	Minneapolis	‡ Martin, Frank E.	Minneapolis
Lukinac, Charles J.	Minneapolis	‡ Martin, George R.	Minneapolis
Lund, George W.	Minneapolis	* Martinson, Carl J.	Wayzata
Lund, Nancy R.	Minneapolis	Martinson, Elmer J.	Wayzata
Lund, Richard R.	Minneapolis	‡ Maslansky, Robert A.	Minneapolis
Lundblad, Rodger R.	Minneapolis	‡ Massee, Joseph S.	Minneapolis
Lundblad, Stanley W.	Minneapolis	Mastbaum, Leonard I.	Minneapolis
Lundeberg, Karl R.	Minneapolis	Mathog, Robert G.	Minneapolis
Lundquist, Charles B.	Minneapolis	Matthews, John A. G.	Minneapolis
Lundquist, Virgil J. P.	Minneapolis	Maunder, John B.	Minneapolis
† Lynch, Michael F.	Minneapolis	† Maxeiner, Stanley R.	Minneapolis
Lyon, Fred A.	Minneapolis	‡ Maxeiner, S. R., Jr.	Minneapolis
Lyon, John D.	Hopkins	Maxwell, Robert E.	Minneapolis
Lysne, Richard B.	Minneapolis	Mayberg, Donald M.	Minneapolis
Lysyj, Anatol	Minneapolis	Meany, Thomas J.	Minneapolis
Lyzenga, Anton G.	Minneapolis	Mears, Thomas U.	Minneapolis
McCaffrey, F. John	Minneapolis	Mecklenburg, Fred E.	Minneapolis
McC Campbell, Malcolm D.	Minneapolis	Medina, Ambrosio M., Jr.	Wayzata
McCannel, Malcolm A.	Minneapolis	‡ Meeker, Henry C.	Minneapolis
McCarthy, Donald	Minneapolis	Meekin, Patrick C.	Minneapolis
McCollister, Robert J.	Minneapolis	‡ Melichar, Paul J.	Minneapolis
McCormick, Donald P.	Minneapolis	Meller, Robert L.	Minneapolis
McDaniel, Orianna	Minneapolis	Mensheha, Nicholas M.	Minneapolis
McFarland, Arthur H.	Minneapolis	‡ Merner Thomas B.	Minneapolis
McGandy, Robert F.	Minneapolis	† Merrick, Charlotte T.	St. Paul
McGovern, Lawrence	Minneapolis		

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COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

	Merrill, Daniel C.	Minneapolis		Nelson, Evan L. Jr.	Minneapo
	Messenheimer, Myron G.	Minneapolis	‡	Nelson, Glen D.	Minneapo
‡	Metz, Donald D.	Minneapolis	†	Nelson, Gunard A.	Minneapo
	Meyer, Alvin J.	Minneapolis	†	Nelson, Harvey	Deerfield Beach, F
	Michael Alfred F.	Minneapolis	‡	Nelson, Lloyd S.	Minneapo
†	Michel, Henry H.	Minneapolis	‡	Nelson, Maxine O.	Minneapo
†	Mickelson, Emma F (Fronk)	Holmes Beach, FL	‡	Nelson, Maynard C.	Minneapo
	Middlebrook, John E.	Minneapolis	‡	Nelson, O. L. Norman	Minneapo
‡	Miller, H. Dawes	Minneapolis	‡	Nelson, Wallace I.	Minneapo
‡	Miller, Harold E.	Minneapolis		Nemanich, George J.	Minneapo
‡	Miller, Hugo E.	Minneapolis		Nerenberg, Sidney	Minneapo
	Miller, J. Carleton	Minneapolis		Nesse, Anton S.	Minneapo
	Miller, Kenneth	Apple Valley	‡	Nesset, Lawren B.	Minneapo
	Miller, William P.	Minneapolis	‡	Nesset, William D.	Minneapo
‡	Millett, D. Keith	Minneapolis	‡	Neumann, Roland F.	Minneapo
	Milroy, Thomas W.	Fridley	‡	Neumeister, Charles A.	Minneapo
‡	Minder, John G.	Minneapolis		Neuwirth, Gerardo D.	Golden Vall
	Mindrum, Gerald G.	Minneapolis		Nicholas, S. Scott, Jr.	Minneapo
	Minsky, Armen A.	Minneapolis		Nichols, Robert T.	Minneapo
‡	Mitby, Irvin L.	Minneapolis		Nicolette, Charles C.	Minneapo
‡	Mitchell, Berton D.	Minneapolis		Nielsen, David J.	Minneapo
‡	Mitchell, Edward C.	College Place, WA	‡	Nilsen, John A.	Minneapo
‡	Mitchell, Mancel T.	Minneapolis		Nivatvonges, Sathat	Minneapo
‡	Mixer, Harry W.	Minneapolis		Nolan, Robert K.	Brooklyn Cent
	Moe, John H.	Minneapolis	‡	Noran, Harold H.	Minneapo
‡	Moe, W. Wyatt	Minneapolis		Norberg, William J.	Fridl
‡	Moehn, John T.	Minneapolis	‡	Nord, Robert E.	Minneapo
†	Moen, Johannes K.	Minneapolis	£	Nordlie, Paul E.	Minneapo
	Moghaddam, Alaeddin	Minneapolis	‡	Norman, Franklin C.	Minneapo
‡	Monson, Einer M.	Minneapolis	‡	Norman, Mark L., Jr.	Minneapo
	Monson, Paul S.	Minneapolis		Norval, Mildred A.	Minneapo
	Monson, Warren A.	Minneapolis	‡	Nuessle, William F.	Minneapo
‡	Moody, David L.	Minneapolis	‡	Nydahl, Bruce C.	Minneapo
†	Moore, Irvin H.	Eden Prairie	†‡	Nydahl, Malvin J.	Minneapo
	Moorhead, Marie	Minneapolis	‡	O'Brien, Bruce J.	Minneapo
	Moos, Daniel J.	Minneapolis	‡	O'Brien, William A.	Minneapo
‡	Mork, A. Harold	Anoka	†	O'Donnell, James E.	Minneapo
‡	Mork, Frank E.	Anoka		O'Leary, John B.	Minneapo
‡	Mork, Frank E., Jr.	Minneapolis		O'Neil, Bernerd L.	Minneapo
	Moss, Nyel H.	Minneapolis		O'Hanlon, William J.	Minneapo
‡	Mosser, Donn G.	Minneapolis	‡	O'Phelan, E. Harvey	Minneapo
	Mossman, Philip L.	Minneapolis		Officer, Charles D.	Burnsvi
‡	Moyer, Leonard B.	Minneapolis		Ohmann, Ronald J.	Minneapo
‡	Mueller, James M.	Minneapolis		Olavs, Olga	Minneapo
‡	Mulholland, William M.	Minneapolis	‡	Olfelt, Paul C.	Minneapo
‡	Mullin, Gerald T., Jr.	Minneapolis	†	Olsen, E. George	Minneton
‡	Mulvahill, John E.	Minneapolis		Olsen, Jay R.	Minneapo
‡	Munkittrick, Ronald C.	Minneapolis	‡	Olson, Alton C.	Minneapo
	Murray, Charles L.	Minneapolis		Olson, C. Kent	Minneapo
†	Murray, Elisabeth M.	Minneapolis		Olson, Carl J.	Minneapo
‡	Muschenheim, Frederick	Minneapolis	‡	Olson, Detlof M.	Minneapo
‡	Muske, Marvin M.	Minneapolis	‡	Olson, Duane C.	Minneapo
‡	Musty, Nicholas J.	Minneapolis	‡	Olson, Hardin E.	Minneapo
†	Myers, Jay A.	Minneapolis	†	Olson, Olof A.	Minneapo
‡	Myhre, James	Minneapolis	‡	Olson, Philip A.	Minneapo
	Mylrea, Murray J.	Burnsville	‡	Olson, Robert A.	Minneapo
	Nagobads, Ilgvars J.	Minneapolis		Olson, Robert E.	Minneapo
	Nagobads, V. George	Minneapolis		Olson, Robert W.	Minneapo
‡	Najarian, John S.	Minneapolis		Olson, Rolland A.	Wayza
	Nash, Eldore B.	Minneapolis	‡	Opheim, Richard H.	Minneapo
	Nathenson, Aaron L.	Minneapolis	‡	Oppen, E. Gerhard	Minneapo
†‡	Neal, Joe M.	Minneapolis		Oppen, Melvin G.	Minneton
	Neal, Robert R., Jr.	Minneapolis		Opstad, Earl T.	Minneapo
†	Nelson, Bernice A.	Minneapolis	‡	Orbuch, Martin W.	Minneapo
†	Nelson, C. Barton	Minneapolis	‡	Orkin, Milton	Minneapo
£	Nelson, Carleton A.	Minneapolis		Orn, Duane L.	Minneapo
‡	Nelson, David W.	Minneapolis		Osterberg, Kenneth A.	Minneapo
	Nelson, Edward N.	Minneapolis		Ostrov, Charles S.	Minneapo
				Ott, Eugene C.	Minneapo

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

Owen, Richard R.Minneapolis
Paal, Dwain J.Minneapolis
† Page, Raymond L.St. Paul
† Paisner, Hyman M.Minneapolis
† Palen, Benjamin J.Scottsdale, AZ
† Palm, E. TheodoreMinneapolis
† Paparella, Michael M.Minneapolis
† Papermaster, RalphMinneapolis
† Papermaster, Theodore C.St. Louis Park
† Park, Wilford E.Minneapolis
Parod, John D.Minneapolis
Parrott, John C.Minneapolis
Pattee, James J.Minneapolis
Patterson, Paul G.Minneapolis
Paule, William J.Minneapolis
Peiper, Warren S.Minneapolis
Peluso, Charles R.Minneapolis
Pennington, MaryMinneapolis
Peper, Martin C.Minneapolis
Perlman, Everett C.Minneapolis
Perlman, Herschel L.St. Louis Park
Peteler, Jennings C. L.Minneapolis
Petersen, Byron D.Minneapolis
Petersen, Deane A.Minneapolis
Petersen, Glenn L.Minneapolis
Petersen, William E.Minneapolis
Peterson, Charles A.Minneapolis
Peterson, Charles R.Minneapolis
Peterson, John A.Minneapolis
Peterson, Oliver H., Jr.Minneapolis
Peterson, Palmer A.Minneapolis
Peterson, Rodney H.Minneapolis
Peterson, Theodore A.Minneapolis
Peterson, Willard C., Jr.Minneapolis
Petit, Julien V.Minneapolis
Petit, Leon J.Minneapolis
Pewters, John T.Minneapolis
Pfohl, Richard A.Minneapolis
Phelps, Kenneth A.Palo Alto, CA
Phelps, Robert D.Minneapolis
Phibbs, Clifford M., Jr.Minneapolis
Pilling, Loran F.Minneapolis
Pincus, MitchellMinneapolis
Pizarro, Remi L.Minneapolis
Plasha, Matthew K.Coon Rapids
Plass, Herbert F. R.Minneapolis
Pleissner, Karl W.Minneapolis
Plimpton, Nathan C.Minneapolis
Pohl, John F.Minneapolis
Poland, Jerome D.Minneapolis
Polesky, Herbert F.Minneapolis
Poley, Brooks J.Minneapolis
Poljack, Stuart J.Minneapolis
Pollak, KurtMinneapolis
Pollock, Anthony J.Minneapolis
† Polzak, James A.Roseville
Pone, John J.Minneapolis
Popadiuk, PeterMinneapolis
Popowich, John G.Minneapolis
† Poppe, Frederick H.Miami, FL
Potter, Robert B.Minneapolis
Pratt, Fred J.Minneapolis
Prem, Konald A.Minneapolis
Preston, Frank S., Jr.Minneapolis
Price, William E.Minneapolis
Prickman, William E.Minneapolis
Probstfield, Jeffrey L.Minneapolis
Priest, Robert E.Minneapolis
Proshek, Lumir C.Minneapolis

‡ Quello, Robert O. B.Minneapolis
Quick, Cedric A.Minneapolis
Quiggle, Arthur B.Minneapolis
Quist, Henry W., Jr.Minneapolis
Raab, David E.Minneapolis
Racer, Harley J.Minneapolis
Ragan, John J.Minneapolis
Raich, John J.Minneapolis
† Raile, Richard B.Minneapolis
Randall, David A.Minneapolis
† Randall, Phillip S.Minneapolis
Ranheim, Phillip J.Minneapolis
† Ratelle, Alexander E.Minneapolis
Recht, Thomas M.Minneapolis
† Reece, Richard L.Minneapolis
† Reed, John H., Jr.Minneapolis
Reed, Sheldon C.Minneapolis
Regan, John J.Minneapolis
† Rehmman, Ronald E.Coon Rapids
Reichel, Samuel M.Minneapolis
† Reif, Harold A.Minneapolis
† Reiley, Richard E.Minneapolis
† Reinhart, Richard O.Minneapolis
Reisdorf, George E.St. Louis Park
† Reiser, Milton P.Minneapolis
† Remole, William D.Minneapolis
Resch, Joseph A.Minneapolis
Reul, Thomas W.Minneapolis
Reynolds, JamesMinneapolis
£ Rhodes, Clinton E.Minneapolis
Rhol, Arnold O.Minneapolis
† Rice, Carl O.Minneapolis
Rice, Edwin G.Minneapolis
Rice, Fred A.Minneapolis
† Richardson, Robert J.Minneapolis
† Richdorf, Lawrence F.Minneapolis
† Rierson, Phillip A.Minneapolis
Riley, John D.Minneapolis
Riordan, Elsie M.Minneapolis
Ripple, Rudolph J., Jr.Minneapolis
† Risch, Ronald E.Minneapolis
Rizer, Dean K.Minneapolis
† Robb, Edwin F.Boca Raton, FL
*† Robbins, Owen F.Minneapolis
Roberts, Byron H.Minneapolis
† Roberts, Lewis J.Minneapolis
Robinson, Cortland O.Minneapolis
Rock, William H.Anoka
† Rocknem, Robert E.Minneapolis
Rockwell, Curtiss V.Minneapolis
† Rodgers, Richard S.Minneapolis
Rogin, NortonMinneapolis
£ Rohrmann, Charles A., Jr.Minneapolis
Rollins, PatMinnetonka
Romness, Kenneth B.Mound
† Rosenbaum, David L.Minneapolis
† Rosendahl, Frederick G.Minneapolis
† Rosenfield, Abraham B.Minneapolis
Rosenow, John H.Minneapolis
Rosenquist, Rudolph J.Minneapolis
Rosenstein, Hanan J.Minneapolis
†† Rosenwald, Reuben M.Anoka
† Rossen, RalphMinneapolis
Rotenberg, Robert J.Minneapolis
† Rothnem, Morris S.Minneapolis
Rubin, ManlyMinneapolis
Rucker, Thomas K.Minneapolis
† Rucker, William H.Minneapolis
† Rud, Norman E.Edina

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COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡	Ruiz, Ernest	Minneapolis
‡	Russeth, Arthur N.	Minneapolis
†‡	Rusten, Elmer M.	Minneapolis
	Rydberg, John S.	Minneapolis
	Rydland, Arne D.	Minneapolis
	St. Cyr, Harry M.	Minneapolis
	St. Cyr, Kenneth J.	Minneapolis
‡	Salchert, John J.	Minneapolis
	Saliterman, Bernard I.	Minneapolis
‡	Salovich, Edward L.	Minneapolis
‡	Salovich, Elmer R.	Minneapolis
	Sanchez, Jose S.	W. St. Paul
‡	Sandt, Karl E.	Minneapolis
	Sanfilippo, Sylvester J.	Minneapolis
	Sartor, Richard	Minneapolis
	Sawyer, Glen T.	Minneapolis
	Sayther, Keith D.	Minneapolis
‡	Sborov, Abe M.	Minneapolis
‡	Scanlan, Patrick J.	Minneapolis
	Schaar, Frances E.	Minneapolis
†	Schaefer, Wesley G.	Minneapolis
	Schaffhausen, Irwin F.	Minneapolis
	Schaffhausen, Mildred	Minneapolis
‡	Scherer, L. Raymond	Minneapolis
	Scherling, Sidney S.	Minneapolis
	Schiele, Burtrum C.	Minneapolis
	Schiller, Philip J.	Minneapolis
#	Schissel, Gregory A.	Washington, D.C.
‡	Schissel, Richard C.	Minneapolis
	Schmidt, W. Robert	Minneapolis
†	Schmitt, Samuel C.	Fallbrook, CA
	Schneck, Jack I.	Minneapolis
	Schoening, Herbert A.	Minneapolis
	Schoenwetter, William F.	Minneapolis
‡	Schottler, Jerry L.	Minneapolis
	Schottler, Max E.	Minneapolis
‡	Schroeder, Albert J.	Minneapolis
‡	Schultz, Alan	Minneapolis
	Schultz, Alvin L.	Minneapolis
‡	Schultz, J. Harold	Minneapolis
‡	Schultz, Peter J.	Minneapolis
	Schultz, Robert J.	Minneapolis
	Schulze, William M.	Minneapolis
‡	Schumacher, John W.	Minneapolis
£	Schumacher, Robert V.	Minneapolis
‡	Schut, Lawrence J.	Minneapolis
	Schwartz, E. Robert	Minneapolis
	Sciarra, John J.	Minneapolis
‡	Scott, Horace G.	Minneapolis
‡	Scott, Robert H.	Minneapolis
	Scott, William R.	Minneapolis
†	Seaberg, John A.	Pequot Lakes
	Seay, James E., III	Minneapolis
	Segal, Edward L.	Minneapolis
	Segal, Martin A.	Minneapolis
	Segal, Marvin S.	Minneapolis
‡	Segal, Sheldon J.	Minneapolis
†	Seham, Max	St. Paul
	Seifert, Gregory L.	Minneapolis
‡	Seifert, Milton H., Jr.	Excelsior
‡	Seljeskog, Edward L.	Minneapolis
	Semba, Thomas	Minneapolis
‡	Semsch, Robert D.	Wayzata
	Severseike, Odean M.	Minneapolis
‡	Seymour, John L.	Minneapolis
	Shackelford, Terry C.	Minneapolis
	Shah, Popatial S.	Osseo
‡	Shandorf, James F.	Minneapolis
	Shanks, James R.	Minneapolis

†	Shaperman, Eva P.	San Diego, CA
	Shapiro, Irving	Minneapolis
	Shapiro, Sidney K.	Minneapolis
‡	Shapiro, Stanley W.	Minneapolis
‡	Shattuck, Clark A.	Minneapolis
‡	Shaw, Howard A.	Minneapolis
	Shea, Andrew W.	Minneapolis
‡	Shemesh, Alvin	Minneapolis
‡	Sher, Lewis	Minneapolis
‡	Sherman, Lloyd F.	Minneapolis
†	Shillington, Maurice A.	Ft. Lauderdale, FL
	Sholler, Lawrence J.	Minneapolis
	Shragg, Robert I.	Minneapolis
	Shronts, John S.	Minneapolis
	Shronts, John F.	Minneapolis
	Sidell, Franklin D.	Minneapolis
	Siebert, Richard C.	Minneapolis
	Siegmann, William C.	Minneapolis
	Sigel, Melvin E.	Minneapolis
‡	Silas, Ralph M.	Minneapolis
	Silver, John D.	Minneapolis
‡	Silverstein, Paul M.	Minneapolis
‡	Simmons, Richard K.	Minneapolis
	Simmons, Richard L.	Minneapolis
	Simo, Kathleen Kay	Minneapolis
‡	Simonson, Donald B.	Minneapolis
	Simso, Lee A.	Minneapolis
	Singher, Lawrence J.	Minneapolis
‡	Sinykin, Melvin B.	Minneapolis
	Sipe, James W.	Coon Rapids
‡	Skjold, Arthur C.	Minneapolis
‡	Sletten, Richard G.	Minneapolis
‡	Slosser, Gaius, J., II	Minneapolis
	Smeby, Loren A.	Minneapolis
	Smiley, John T.	Minneapolis
†‡	Smisek, Frank M.	Minneapolis
†	Smith, Adam M.	Minneapolis
‡	Smith, Archie M.	Minneapolis
	Smith, Barlow	Minneapolis
‡	Smith, Baxter A., Jr.	Minneapolis
‡	Smith, Graham G.	Minneapolis
‡	Smith, Henry T.	Minneapolis
‡	Smith, John E.	Minneapolis
	Smith, Nadine G.	Minneapolis
‡	Smith, Theodore S.	Minneapolis
‡	Soderberg, Richard J.	Minneapolis
†‡	Soderlind, Ragnar T.	Minneapolis
‡	Soiseth, Robert P.	Minneapolis
‡	Solhaug, Samuel B., Jr.	Minneapolis
	Soll, Robert W.	Minneapolis
	Solvason, Harold M.	Minneapolis
‡	Spano, Joseph P.	Minneapolis
‡	Spencer, Bernard J.	Minneapolis
	Spencer, David L.	Minneapolis
	Spenny, Edward A. L.	Minneapolis
	Spink, Wesley W.	Minneapolis
‡	Sponsel, Kenath H.	Minneapolis
‡	Stahr, Aubrey C.	Hopkins
	Standefer, James E.	Minneapolis
†	Stanford, Charles E.	Wapuna
‡	Steidl, Richard M.	Minneapolis
†‡	Stelter, Lloyd A.	Minneapolis
†	Stenstrom, Annette T.	Grand Marais
	Stenzel, Donald A.	Minneapolis
	Stenzel, Joseph A.	Minneapolis
	Stephens, William E.	Minneapolis
	Sterrie, Norman A.	Minneapolis
	Stevens, Sheridan S. H.	Minneapolis
	Stewart, Marvin J.	Minneapolis
‡	Stiegler, Farrell S.	Minneapolis

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡ Stillman, M. Thomas	Rochester	‡ Tsai, Shih Hao	Minnetonka
‡ Stoltz, Robert C.	Minneapolis	‡ Tucker, Richard C.	Minneapolis
‡ Stone, Norman F.	Minneapolis	‡ Tudor, Richard B.	Minneapolis
‡ Stone, Stanley P.	Minneapolis	£ Tully, Timothy E.	Minneapolis
‡ Strait, Herbert S.	Minneapolis	‡ Turbak, Charles E.	Minneapolis
‡ Strand, Clarence M.	Minneapolis	‡ Turkbak, Nejat	Minneapolis
‡ Strand, Peter J.	Minneapolis	‡ Twidwell, Joseph E.	Minneapolis
‡ Strand, Richard C.	Bloomington	# Ulrich, Wesley D.	Mafrak, Jordan
‡ Streu, Richard E.	Minneapolis	‡ Ulvestad, Harold S.	Minneapolis
‡ Strickler, Jacob H.	Minneapolis	‡ Umana, C. Robert	Minneapolis
§ Stringer, Gene C.	Minneapolis	‡ Utendorfer, Robert W.	Minneapolis
‡ Strobel, Jack L.	Minneapolis	‡ Vaaler, Robert T.	Minneapolis
‡ Strom, Gordon W.	Minneapolis	‡ Valgema, Romil	Minneapolis
‡ Strom, Robert L.	Minneapolis	‡ Van Oppen, Dirk J. A.	Minneapolis
‡ Stromgren, Delph T.	Minneapolis	‡ Van Tassel, Robert A.	Minneapolis
‡ Stromme, William B.	Minneapolis	‡ Vellek, Donald G.	Minneapolis
‡ Strunk, Clarence A.	Minneapolis	‡ Verby, John E.	Minneapolis
‡ Student, Richard E.	Minneapolis	‡ Vik, A. Elliott	Minneapolis
‡ Sturges, Robert L.	Minneapolis	‡ Vilaseca, Louis B.	Minneapolis
‡ Subak, Barbara H.	Minneapolis	‡ Vilella, Ronald L.	Minneapolis
‡ Subby, Walter	Minneapolis	‡ Von Drashek, Stanley C.	Minneapolis
‡ Sukov, Marvin	Minneapolis	‡ von Weiss, David L.	Minneapolis
‡ Sulciner, Aurel	Minnetonka	‡ Vorlicky, Loren N.	Minneapolis
‡ Sundberg, A. Bruce	Minneapolis	‡ Waschle, Richard K.	Minneapolis
‡ Sutherland, John E.	Minneapolis	‡ Wagner, Christian J.	Minneapolis
‡ Swaiman, Kenneth F.	Minneapolis	‡ Wagner, Robert M.	Minneapolis
‡ Swallen, Thomas O.	Minneapolis	‡ Waldron, Carl W.	Scottsdale, AZ
‡ Swanson, David A.	Minneapolis	‡ Waldron, John F.	Minneapolis
‡ Swanson, Gerald E.	Minneapolis	‡ Walker, Fredric E., Jr.	Minneapolis
‡ Swanson, John O.	Minneapolis	‡ Wall, Carl R.	Grand Marais
# Swanson, Wallace L.	Quito, Ecuador	‡ Wallinga, Jack V.	Minneapolis
‡ Sweetser, Horatio B.	Minneapolis	‡ Walonick, Albert L.	Minneapolis
‡ Sweetser, Theodore H., Jr.	Minneapolis	‡ Walsh, John G.	Minneapolis
‡ Swendseen, Carl J.	Minneapolis	‡ Wang, Josef K.	Minneapolis
‡ Swenson, Floyd J.	Minneapolis	‡ Wang, Yang	Minneapolis
‡ Swenson, James D.	Minneapolis	‡ Wangenstein, Owen H.	Minneapolis
‡ Swenson, Richard W.	Minneapolis	‡ Warren, John W.	Minneapolis
‡ Swift, Dean C.	Minneapolis	‡ Watson, C. Gordon	Minneapolis
‡ Symchych, Boris E.	Minneapolis	‡ Watson, Cecil J.	Minneapolis
‡ Tam, Ernest C.	Minneapolis	‡ Wattenberg, Lee W.	Minneapolis
‡ Tambornino, Joseph M.	Minneapolis	‡ Weatherhead, D. Stuart P.	Minneapolis
‡ Tanaka, Shin	Minneapolis	‡ Webber, Richard J.	Minneapolis
‡ Tangen, George V.	Minneapolis	‡ Weber, Lowell W.	Minneapolis
‡ Taylor, Joseph H.	Ft. Lauderdale, FL	# Wegleitner, Mark J.	El Paso, TX
‡ Tchou, Mien-Fa	Minneapolis	‡ Weisberg, Martin G.	Minneapolis
‡ Telander, Robert L.	Minneapolis	‡ Weisberg, Rapheal J.	Minneapolis
‡ tenBensel, Robert W.	Minneapolis	‡ Weisberg, Stephen C.	Minneapolis
‡ Tenner, Robert J.	Minneapolis	‡ Weisel, Mary R.	Minneapolis
‡ Teska, Byron A.	Minneapolis	‡ Wendland, John P.	Minneapolis
‡ Teynor, Joseph W.	Minneapolis	‡ Wengler, Robert A.	Minneapolis
‡ Tharp, Ralph	Minneapolis	£ Verges, Thomas M.	Minneapolis
‡ Thelemann, Arthur R., Jr.	Minneapolis	‡ Werner, George	Minneapolis
‡ Theobalt, Inge M.	Minneapolis	‡ Wesolowski, Stanley	Minneapolis
‡ Theologides, Anthanasios	Minneapolis	‡ West, Catherine C.	Edina
‡ Thomasson, Robert D.	Minneapolis	‡ Wester, Mary Sue	Minneapolis
‡ Thomas, A. Boyd	Minneapolis	‡ Westgate, Hugh D.	Minnetonka
‡ Thompson, Arthur	Minneapolis	‡ Westreich, Gilbert	Minneapolis
‡ Thorson, Stuart V.	Minneapolis	‡ Wetherby, Macnider	Minneapolis
‡ Thysell, Desmond M.	Minneapolis	‡ Whittington, Joseph F.	Coon Rapids
‡ Tierney, Jon P.	Minneapolis	‡ Wett, Richard J.	Minneapolis
‡ Titrud, Leonard A.	Minneapolis	‡ Wexler, Harold M.	Minneapolis
‡ Tobin, John A.	Minneapolis	‡ Wheeler, Robert W.	Minneapolis
‡ Tobin, John D.	Minneapolis	‡ Whitacre, John C., II	Minneapolis
‡ Torp, William B.	Minneapolis	‡ White, Asher A.	Minneapolis
‡ Torres, Fernando	Minneapolis	‡ White, Willard D.	Edina
‡ Town, Louise A.	Minneapolis	‡ Whitesell, Lloyd A.	Minneapolis
‡ Townes, C. Dwight, Jr.	Minneapolis	‡ Wicklund, Paul E.	Wayzata
‡ Trach, Benedict B.	Minneapolis	‡ Widen, Wilford F.	Minneapolis
‡ Trost, Francis J.	Minneapolis	‡ Wigdahl, Lowell C.	Minneapolis
‡ Trow, James E.	Minneapolis	‡ Wigdahl, Luther O.	Minneapolis

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Hennepin County Medical Society (Continued)

‡ Wilcox, William A.	Minneapolis
Wild, John J.	Minneapolis
† Wilder, Russell M., Jr.	Topeka, KS
‡ Wilder, Walter L.	Minneapolis
†‡ Wilken, Paul A.	Minneapolis
† Williams, Henry L.	West St. Paul
‡ Williams, Paul A.	Minneapolis
Williams, Richard E.	Robbinsdale
Wilson, John A.	Minneapolis
‡ Wilson, Robert E.	Minneapolis
‡ Wilson, Thomas M., Jr.	Minneapolis
Winchell, Paul	Minneapolis
Winter, Laurence E.	Minneapolis
† Winther, Nora M. C.	Columbus, OH
‡ Wippermann, Frederic F.	Minneapolis
Wisioł, Erich S.	Minneapolis
Wisness, Osmund A.	Savage
Woellner, Richard C.	Minneapolis
†‡ Wohlrabe, Arthur A.	Minneapolis
‡ Wohlrabe, Robert G.	Minneapolis
‡ Wolter, Frederick H.	Minneapolis
Wong, Edward T.	Minneapolis
Wong, Freeman E.	Minneapolis
£ Wong, Howard H.	Bloomington
Woodbury, John W.	Minneapolis

Woodley, Donald W.	Minneapolis
‡ Worrell, Philip J.	Minneapolis
‡ Woyda, William C.	Minneapolis
Wright, Donald L.	Minneapolis
Wright, Francis S.	Minneapolis
Wright, William S.	Minneapolis
Wuest, Frederick C.	Wayzata
† Wynne, Herbert M. N.	Wayland, MA
Yeager, Terrell F.	Anoka
Yelle, Matthew D.	Anoka
†‡ Ylvisaker, Ragnvald S.	Minneapolis
Yonehiro, Earl G.	Minneapolis
Young, Ronald C.	Minneapolis
Yue, Alexander	Minneapolis
Yue, Wen Y.	Excelsior
Zahrendt, O. Lewis	Minneapolis
Zak, Solomon J.	Minneapolis
Zarling, U. Richard	Minneapolis
‡ Zaworski, Leo A.	Minneapolis
‡ Zelickson, Alvin S.	Minneapolis
† Zierold, Arthur A.	Minneapolis
Zimering, Sakina	Minneapolis
‡ Zinn, Charles W.	Wayzata
‡ Zinter, Ferdinand A.	Minneapolis

LYON-LINCOLN COUNTY MEDICAL SOCIETY

Lyon and Lincoln Counties
Regular meetings, 6 meetings—Spring and Fall
Annual meeting, November
Number of members 25

PRESIDENT

Panning, W. P.	Marshall
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SECRETARY

Kaczrowski, William	Marshall
‡ Bosley, Patrick	Balaton
‡ Eckdale, John E.	Marshall
‡ Hedenstrom, Philip C.	Marshall
†‡ Johnson, C. Percy	Tyler
‡ Kaczrowski, William	Marshall
† Kreuzer, Titus C.	New Brighton
Lee, Norman J.	Tracy
Magtibay, Meynardo B.	Tyler
‡ Monson, Leonard J.	Canby
‡ Mueller, LeRoy E.	Hendricks

‡ Mulder, Richard D.	Ivanhoe
‡ Murphy, Joseph E.	Marshall
‡ Myers, John W.	Canby
‡ Odland, Olin M.	Marshall
‡ Olson, Robert T.	Canby
‡ Panning, Wayne P.	Marshall
‡ Peterson, Kenneth A.	Marshall
† Rohrer, Christian A.	Madison Lake
Schroepfel, Robert O.	Tracy
‡ Stover, Laddie E.	Marshall
‡ Taintor, Ronald W.	Marshall
Tan, Ruby	Marshall
‡ Thompson, Carl O.	Hendricks
† Workman, Warner G.	Tracy
† Yaeger, Wilbert W.	Torrance, CA

McLEOD COUNTY MEDICAL SOCIETY

McLeod County
Regular meetings, third Thursday of each month
Annual meeting, November
Number of members 15

PRESIDENT

Jensen, Alvin M.	Brownton
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SECRETARY

Smyth, John J.	Lester Prairie
‡ Bretzke, Carl O.	Hutchinson
‡ Close, Gerald A.	Glencoe
Griebie, Grant L.	Hutchinson
Hegrenes, Robert L.	Hutchinson
‡ Huebert, Dan W.	Hutchinson
‡ Jensen, Alvin M.	Brownton

Ketola, Tauno E.	Glencoe
‡ Kleinkauf, Thomas P.	Hutchinson
McNeil, Maurice R.	Glencoe
Navratil, Donald R.	Glencoe
‡ Peterson, Kenneth H.	Hutchinson
* Selmo, Joseph D.	Norwood
‡ Smith, George R.	Hutchinson
‡ Smyth, John J.	Lester Prairie
‡ Stifter, A. J.	Winsted
‡ Truesdale, Clark W.	Glencoe

COUNTY MEDICAL SOCIETY ROSTER

Ramsey County Medical Society (Continued)

† Hinckley, Robert G.	White Bear Lake	† Kugler, Alex A.	St. Paul
† Hiniker, Louis P.	St. Paul	† Kuske, Albert W.	St. Paul
† Hippchen, Ray C.	St. Paul	† Kusske, Bradley W.	St. Paul
*† Ho, Shu Kang	St. Paul	† Kusske, Douglas R.	St. Paul
† Hodgson, Corrin H.	St. Paul	† Kvam, Lowell L.	St. Paul
† Hodgson, Jane E.	St. Paul	† Lade, Roswith I.	St. Paul
† Hohmann, Albert	St. Paul	† LaFave, James W.	St. Paul
† Hollinshead, William H.	St. Paul	† Lampert, Ronald M.	St. Paul
†† Holt, John E.	St. Paul	† Lane, Miles I.	White Bear Lake
† Hopkins, G. Wendell	Minneapolis	† Lannin, Bernard G.	St. Paul
† Hottinger, George C.	St. Paul	† Lannin, Donald R.	St. Paul
† Houle, Rollin J.	St. Paul	† Larkin, John E.	St. Paul
† Houlton, William H.	St. Paul	† Larson, Eva Jane Ostergren	St. Paul
£ Howard, Malin L.	St. Paul	† Larson, Jerrold V.	St. Paul
† Howe, Newell W.	West St. Paul	† Laszewski, Franz Von Zelberschwecht	St. Paul
† Hunt, Vincent R.	Minneapolis	† Lawler, Kevin M.	St. Paul
† Hunter, Samuel W.	St. Paul	† Layman, Thomas E.	St. Paul
† Hurwitz, Milton M.	St. Paul	† Leach, Clifford G.	St. Paul
† Huseby, Thomas L.	St. Paul	† Leahy, Dennis M.	St. Paul
† Husebye, Kjeld O.	St. Paul	† Lees, Jack R.	St. Paul
† Ireland, Gerald W.	St. Paul	† Lehman, Donald S.	St. Paul
† Jackson, William C.	St. Paul	† Leick, Richard M.	St. Paul
† James, Ellery M.	St. Paul	† Leider, Lloyd L.	St. Paul
† James, John W.	St. Paul	† Leitch, Archibald	South St. Paul
† Janecek, James,	New Brighton	† Leonard, Stanley	St. Paul
† Janssen, Martin E.	St. Paul	† Lerdaahl, Kenneth	St. Paul
† Jarvis, Charles W.	St. Paul	† Lerner, Irving, J.	St. Paul
† Jastram, Rupert M.	St. Paul	† Lessard, Richard J.	St. Paul
† Johnson, Byron R.	St. Paul	† Leven, N. Logan	St. Paul
† Johnson, Carl E.	St. Paul	† Leverenz, Carleton W.	St. Paul
† Johnson, Carolyn A.	St. Paul	† Levitan, Leonard H.	St. Paul
† Johnson, Daniel T.	St. Paul	† Levitt, George X.	St. Paul
† Johnson, David W.	St. Paul	† Lewis, Joyce S., Jr.	Minneapolis
† Johnson, Herbert W.	St. Paul	† Lick, William J.	St. Paul
† Johnson, Lyle O.	St. Paul	† Lien, Richard J.	St. Paul
† Johnson, Richard J.	St. Paul	† Lightbourn, Edgar L.	Hastings
† Johnson, Robert H.	St. Paul	† Lilleberg, Norbert J.	St. Paul
† Johnson, Rodger L.	St. Paul	† Lillemoen, Roger D.	Minneapolis
† Johnson, Stanley M.	White Bear Lake	† Lillie, Andrew R.	St. Paul
† Johnson, Thomas E.	St. Paul	† Lindell, Robert E.	St. Paul
† Joseph, Arnold H.	St. Paul	† Lindquist, Max F.	South St. Paul
† Kantar, Yale C.	St. Paul	† Litkewitsch, Helene	St. Paul
† Kaplan, David H.	Edina	† Lobell, Michael	St. Paul
† Kapps, F. Donald	St. Paul	† Loken, Selmer M.	St. Paul
† Karon, Everett H.	St. Paul	† Love, Thomas A.	St. Paul
† Karon, Irvine M.	St. Paul	† Lowe, Alexander D.	West St. Paul
† Kasper, Eugene M.	St. Paul	† Lowe, Thomas A.	South St. Paul
† Katz, Louis J.	Long Beach, CA	† Lufkin, Murray W.	St. Paul
† Keenan, Thomas P.	St. Paul	†† Lundholm, Arthur M.	Princeton
† Keller, Curtis	White Bear Lake	† Lunseth, John B.	St. Paul
† Kelly, Edward H.	St. Paul	† Lunzer, Richard G.	St. Paul
† Kelly, Helen M.	Cottage Grove	† Lutter, Lowell D.	St. Paul
† Kelly, Joseph R.	St. Paul	† Lynch, Francis W.	St. Paul
† Kelsey, Chauncey M.	St. Paul	† Lynch, Raymond P.	St. Paul
† Kenyon, Thomas J.	St. Paul	† Lynch, Richard P.	St. Paul
† Kesting, Herman	St. Paul	† McBride, John W.	St. Paul
† Kleinsasser, Warren L.	St. Paul	† McCafferty, Charles W.	St. Paul
† Kluge, John W.	St. Paul	† McCain, Donovan L.	St. Paul
† Knowles, Roy C.	St. Paul	† McCarthy, Charles J.	St. Paul
† Knutson, Gerhard E.	St. Paul	† McClellan, Robert J.	St. Paul
† Knutson, Robert C.	St. Paul	† McCloud, C. Naumann	St. Paul
† Kodres, Nina	St. Paul	† McCullough, Jeffrey J.	St. Paul
† Koelz, Thomas A.	St. Paul	† McEllistrem, Edward J.	St. Paul
† Kosiak, Michael	St. Paul	† McEllistrem, Gerald D.	St. Paul
† Kovacs, J. Curtis	St. Paul	† McEwan, Alexander	St. Paul
† Koza, Donald W.	St. Paul	† McGroarty, Brian J.	St. Paul
† Kramer, James D.	St. Paul	† McHutchinson, Samuel K.	St. Paul
† Krasnow, Brian M.	Minneapolis	† McKenzie, Eva E.	St. Paul
† Krezowski, Thomas K.	St. Paul	† McLeod, John A.	St. Paul
† Kriel, Robert L.	St. Paul		

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Ramsey County Medical Society (Continued)

‡ McNeill, John A.	St. Paul	‡ Pangalos, Anastase	St. Paul
‡ Mackoff, Sam M.	Phoenix, AZ	‡ Palm, Neil M.	St. Paul
‡ MacMillan, David G.	St. Paul	‡ Paulson, Elmer C.	St. Paul
† Madland, Robert S.	St. Paul	‡ Paulson, Wallace J.	St. Paul
‡ Malerich, J. Anthony, Jr.	Cottage Grove	‡ Peake, Janna Zoe	St. Paul
‡ Manlove, Charles H., Jr.	St. Paul	† Pearson, Fritz R.	St. Paul
‡ Marta, John B.	St. Paul	‡ Pearson, Malcolm M.	St. Paul
‡ Martin, Dwight L.	St. Paul	† Pedersen, Arthur H.	St. Paul
‡ Mateo, Guillermo	St. Paul	‡ Pelletier, Rene W.	St. Paul
‡ Matus, Richard N.	St. Paul	‡ Perry, John F., Jr.	St. Paul
‡ Mazzitello, William F.	St. Paul	£ Petersen, Kenneth	Portland, OR
‡ Mears, Burtis J.	St. Paul	‡ Peterson, Donald H.	St. Paul
‡ Medelman, John P.	St. Paul	‡ Peterson, Edward A.	St. Paul
‡ Melancon, Joseph F.	St. Paul	£ Peterson, Garry F.	St. Paul
‡ Merrick, Robert L.	St. Paul	‡ Peterson, Harold O.	Minneapolis
‡ Messenger, Michael A.	St. Paul	‡ Peterson, Roy L.	White Bear Lake
‡ Michienzi, Leonard J.	St. Paul	‡ Phillips, Leonard	St. Paul
‡ Miller, Albert G.	St. Paul	‡ Pilney, Frank T.	St. Paul
‡ Miller, Fletcher A.	St. Paul	‡ Plotke, Harry L.	St. Paul
‡ Miller, Winston R.	St. Paul	‡ Polski, Paul G.	South St. Paul
‡ Miller, Zondal R.	St. Paul	‡ Post, Edmund A.	St. Paul
‡ Milnar, Frank J.	St. Paul	‡ Powers, Robert L.	St. Paul
‡ Mishek, Charles J.	St. Paul	‡ Proud, Harry S.	St. Paul
‡ Mitchell, George S.	St. Paul	‡ Quast, John E.	St. Paul
† Molander, Herbert A.	St. Paul	‡ Quattlebaum, Frank W.	St. Paul
‡ Molina, J. Ernesto	St. Paul	‡ Raaen, Olaf J.	St. Paul
‡ Moller, Jurgen J.	West St. Paul	‡ Rabceovich, Anatole	St. Paul
‡ Monahan, Robert H.	St. Paul	‡ Ragnoli, Thomas C.	St. Paul
‡ Mooney, Robert D.	St. Paul	‡ Ralph, James R.	St. Paul
‡ Moren, J. Adelaide	St. Paul	‡ Ramlow, Ralph M.	West St. Paul
‡ Mowlem, Albert	St. Paul	*† Ramsey, Walter R.	St. Paul
‡ Mulford, Beatrice	St. Paul	‡ Rath, Otto N., Jr.	St. Paul
‡ Muller, A. Eugene	North St. Paul	‡ Rauenhorst, John M.	St. Paul
‡ Mundahl, Harold R.	St. Paul	‡ Ravits, Harold G.	St. Paul
‡ Murphy, Jack T.	St. Paul	‡ Rea, Charles E.	St. Paul
£ Murtaugh, Robert J.	St. Paul	‡ Redleaf, Paul D.	St. Paul
‡ Myaya, Po	St. Paul	‡ Reif, Robert W.	St. Paul
‡ Neher, Frederick J.	St. Paul	‡ Richardson, Edward J., Jr.	St. Paul
‡ Neira, Edward H.	St. Paul	‡ Rick, Paul F. W.	St. Paul
‡ Nelms, Charles R. Jr.	St. Paul	‡ Rinkey, Eugene	St. Paul
£ Nelson, David J.	St. Paul	† Ripple, Rudolph J.	St. Paul
‡ Nelson, Delbert R.	St. Paul	†‡ Ritt, Albert E.	St. Paul
‡ Nelson, Loren E.	St. Paul	‡ Roach, Charles A.	St. Paul
‡ Nelson, Louis A.	St. Paul	‡ Roach, Donald E.	St. Paul
‡ Nelson, Robert P.	St. Paul	£ Rodning, Charles B.	St. Paul
‡ Nelson, Ronald J.	St. Paul	‡ Rolig, David H.	West St. Paul
‡ Nesvacil, Leon	St. Paul	‡ Romero, Jose B.	St. Paul
‡ Nichols, Thomas O.	St. Paul	†‡ Rosenthal, Robert	St. Paul
£ Nimlos, Kenneth O.	St. Paul	*‡ Roth, George C.	St. Paul
£ Nimlos, Lenore O.	St. Paul	‡ Rowe, Clarence J., Jr.	St. Paul
‡ Norman, David D.	St. Paul	‡ Roy, Philemon C.	St. Paul
‡ Norquist, Joseph L.	St. Paul	‡ Rukavina, John G.	St. Paul
‡ Nussbaum, Daniel	St. Paul	‡ Rushay, Arthur J.	White Bear Lake
*† Nye, Lillian L.	St. Paul	‡ Rusterholz, Alan P.	St. Paul
‡ O'Brien, Gerald R.	Minneapolis	†‡ Ryan, John J.	St. Paul
‡ O'Brien, John C.	St. Paul	‡ Ryan, Joseph M.	St. Paul
‡ O'Kane, Thomas W.	St. Paul	‡ Sand, Richard E.	St. Paul
‡ O'Malley, Valentine	St. Paul	‡ Sargent, John H.	St. Paul
‡ O'Neill, Nial C.	St. Paul	‡ Savett, Laurence A.	St. Paul
† O'Reilly, Bernard E.	Sun City, AZ	‡ Saxena, Krishna M.	St. Paul
‡ Ockuly, Orville E.	St. Paul	‡ Saxena, Kusum	St. Paul
† Ogden, Warner	River Falls, WI	‡ Schaffhausen, George E.	St. Paul
† Ohage, Justus	St. Paul	‡ Scherek, Jerome J.	St. Paul
‡ Olsen, Ralph L.	St. Paul	‡ Schloff, Ivan	St. Paul
‡ Olson, Barbara F.	Minneapolis	‡ Schloff, Leonard D.	St. Paul
‡ Orr, Ernest W.	St. Paul	‡ Schmidtke, Reinhardt L.	Minneapolis
‡ Osekowsky, Henry J.	St. Paul	‡ Schochet, H. Laurence	St. Paul
†‡ Ouellette, Alfred	St. Paul	‡ Schoewe, Richard W.	Minneapolis
‡ Owens, Frederick M., Jr.	St. Paul	† Schons, Edward	Minnetonka Beach
		‡ Schossow, George W.	White Bear Lake
		‡ Schroeckenstein, Hugo F.	St. Paul

COUNTY MEDICAL SOCIETY ROSTER

Ramsey County Medical Society (Continued)

‡ Schultz, Paul E.	St. Paul	‡ Troup, Elliott	St. Paul
‡ Schwartzkopff, Othild	St. Paul	‡ Trow, William H.	St. Paul
‡ Scott, Eugene E.	St. Paul	‡ Tuason, Vicente B.	St. Paul
£ Sejvar, Joseph P.	St. Paul	‡ Tveten, Omar A.	St. Paul
‡ Sekhon, Mohan S.	St. Paul	‡ Ubel, Frank A.	St. Paul
‡ Sells, Richard J.	St. Paul	‡ Vaccarella, R. James	St. Paul
‡ Sethre, Arthur E.	St. Paul	‡ Van Bergen, Frederick H.	Minneapolis
†‡ Setzer, Hobert J.	St. Paul	‡ Van De Riet, Lowell W.	St. Paul
‡ Shear, Howard H.	West St. Paul	‡ Varco, Richard L.	St. Paul
‡ Shelander, Marcus I.	St. Paul	‡ Vaughn, C. Gordon	St. Paul
‡ Siegel, Clarence	W. Palm Beach, FL	‡ Veinbergs, Arnold	St. Paul
‡ Siegel, Leighton G.	St. Paul	† Veirs, Dean M.	Hastings
‡ Simmonds, Harry N. L.	St. Paul	† Venables, Alexander E.	Marysville, WV
‡ Simons, Leander T.	St. Paul	‡ Venters, Homer D., Jr.	St. Paul
‡ Singer, Benjamin J.	St. Paul	£ Vessey, Ronald R.	Minneapolis
‡ Skelly, George A.	St. Paul	‡ Villafani, Mario F.	St. Paul
‡ Skinner, Abbott	St. Paul	‡ Volk, Donald M.	St. Paul
† Skinner, Harvey O.	St. Paul	‡ Votel, Thomas W.	St. Paul
‡ Smiley, Donald P.	St. Paul	‡ Waas, Charles W.	St. Paul
†‡ Smisek, Elmer A.	St. Paul	*† Walker, Arthur E.	St. Paul
‡ Smith, H. Nippert	St. Paul	‡ Wall, James O.	St. Paul
£ Smith, James C.	St. Paul	‡ Walsh, Edward F.	St. Paul
‡ Smith, Vernon D. E.	St. Paul	‡ Walsh, William E.	St. Paul
‡ Smith, William T.	St. Paul	‡ Walter, Clarence W.	St. Paul
† Snyder, George W.	St. Paul	‡ Wang, Helen H.	St. Paul
† Sohlberg, Olof I.	St. Paul	‡ Wangsness, Mary S.	St. Paul
‡ Sommerdorf, Vernon L.	St. Paul	‡ Warhol, Richard M.	St. Paul
‡ Sorem, Milton B.	St. Paul	‡ Warner, Clyde M.	St. Paul
†‡ Souster, Benjamin B.	St. Paul	‡ Warren, Cecil A.	St. Paul
‡ Sowada, Ernest J.	St. Paul	‡ Waters, Alvin W.	St. Paul
‡ Sperl, Michael P., Jr.	St. Paul	‡ Watson, P. Theodore	St. Paul
‡ Sprafka, Gregory A.	St. Paul	‡ Watson, William H. A.	St. Paul
‡ Sprafka, Joseph L.	St. Paul	‡ Watson, William J.	Newport
‡ Spraitz, Anton F., Jr.	St. Paul	‡ Watz, Clarence E.	St. Paul
‡ Stafne, John G.	St. Paul	‡ Webb, Alex G., Jr.	St. Paul
‡ Steinberg, Charles L.	St. Paul	‡ Webber, Fred L.	St. Paul
‡ Sterner, Donald C.	St. Paul	‡ Wedes, Deno J.	St. Paul
‡ Sterner, John J.	St. Paul	‡ Weier, Thomas E.	St. Paul
‡ Strate, Richard G.	St. Paul	*† Weis, Benjamin A.	St. Paul
‡ Straus, Maurice L.	St. Paul	† Weisberg, Maurice	St. Paul
‡ Strem, Edward L.	St. Paul	‡ Wenzel, Gilbert P.	St. Paul
‡ Sturley, Rodney F.	St. Paul	‡ Westover, Darrell E.	St. Paul
‡ Sullivan, Cornelius	St. Paul	‡ Wetteland, Thomas F.	West St. Paul
‡ Sullivan, W. Albert, Jr.	St. Paul	‡ Wetzel, Earl V.	St. Paul
‡ Swanson, Lawrence J.	West St. Paul	‡ Whiting, F. Douglas	St. Paul
‡ Swanson, Ralph H.	West St. Paul	‡ Wiencke, William M.	St. Paul
† Swendson, James J.	St. Paul	‡ Wier, G. Thomas	St. Paul
‡ Swenson, Donald B.	St. Paul	‡ Williams, George E.	St. Paul
‡ Syong, Matilde	St. Paul	‡ Williams, Harry J., III	St. Paul
‡ Taddeini, Luigi	St. Paul	‡ Williams, Hugh J.	St. Paul
‡ Tanasichuk, Murray A.	St. Paul	‡ Williams, John A.	St. Paul
‡ Tani, George	St. Paul	‡ Williams, Richard A.	Cottage Grove
‡ Tate, Wayne E.	South St. Paul	‡ Wilson, Fred B.	St. Paul
‡ Teeter, Richard R.	St. Paul	‡ Winter, Robert B.	St. Paul
‡ Teisberg, John E.	St. Paul	‡ Wolkoff, Hyman J.	St. Paul
‡ Thalhuber, Wayne H.	St. Paul	‡ Woodburn, Robert L.	St. Paul
‡ Thompson, Wayne W.	St. Paul	‡ Woolfrey, Bertram F.	St. Paul
‡ Tiffany, Francis B.	St. Paul	‡ YaDeau, Richard E.	St. Paul
‡ Tifft, Cyril R.	St. Paul	† Youngren, Everett R.	St. Paul
‡ Tongen, Lyle A.	St. Paul	† Zachman, Leo L.	St. Paul
‡ Travis, James S.	St. Paul	‡ Zagaria, James F.	St. Paul
‡ Tregilgas, Richard B.	St. Paul	‡ Zanick, David C.	St. Paul
‡ Trotman, Neil M.	St. Paul	‡ Zarling, Max E.	St. Paul
		‡ Zdenek, Kalyanaraman A.	St. Paul

COUNTY MEDICAL SOCIETY ROSTER

RANGE MEDICAL SOCIETY

Koochiching, Itasca and the Northern Portion of St. Louis County
Regular meetings, fourth Tuesday of the Month — Annual meeting, January
Number of members 119

PRESIDENT

Stolen, Keith H.Grand Rapids

SECRETARY

Antonelli, Jordan J.Hibbing

CORRESPONDING SECRETARY

Evans, Mrs. VirginiaHibbing

Ahola, Kenneth E.Hibbing

Alexander, Paul J.Hibbing

‡ Anderson, Russell H.Virginia

Antonelli, Jordan J.Hibbing

Antonow, Arthur M.Virginia

Avren, Barbara L.Virginia

Baich, Velemir M.Coleraine

Balderson, Robert P.Grand Rapids

Baraga, Anthony R.Hibbing

Barnes, Richard E.Aurora

Bergen, Richard M.Grand Rapids

Bernal, JorgeVirginia

Bolz, J. ArnoldGrand Rapids

Bonner, John L.Grand Rapids

Braun, Ohrmundt C.Grand Rapids

Campos, AmadorAurora

Chermak, Francis G.Phoenix, AZ

‡ Ciriacy, Edward W.Minneapolis

‡ Coe, Robert O.Virginia

Colosey, Frederick J.Virginia

Cope, Hershel B.Virginia

Coy, Douglas J.Grand Rapids

‡ Crow, George M.International Falls

Davenport, Jay A.Virginia

DeMarais, Lloyd C.Hibbing

Decker, Charles W.Hibbing

Dobler, Manfred G.Ely

Doren, Austin H.Littlefork

Drucker, Franklin G.Bigfork

Eisenman, WalterHibbing

‡ Engelstad, Wendell P.Virginia

Erickson, Vernon D.Grand Rapids

Evensta, John B.Grand Rapids

Ewens, George B.Virginia

Ferrell, Clarence R.Moose Lake

Flynn, Bernard F.Hibbing

French, Bayard T.Hibbing

Friedlieb, Oskar P.Virginia

Gerend, Thomas J.Virginia

Glomstad, Gary B.Grand Rapids

Goodall, David C.Deer River

Gorden, A. MarcInternational Falls

Grahek, Jack P.Ely

‡ Greene, Gordon O.Hibbing

Grinley, Andrew V.Grand Rapids

Halper, BernardHibbing

Halverson, Kermit J.Parkville

Hansen, Robert E.Hibbing

† Heiam, William C.Cook

Helwig, Karl L.Virginia

Henwood, Wesley C.Virginia

Holm, Owen W.Hibbing

Iammatteo, PatHibbing

Ibrahim, George W.Virginia

£ Iverson, Paul C.Grand Rapids

† Jacobson, ClarenceChisholm

Johnson, Calvin J.Grand Rapids

* Johnsrud, LuverneHibbing

Johnston, H. WayneVirginia

Kampen, Charles P.Grand Rapids

‡ Karges, Laurel E.Grand Rapids

‡ Karish, Louis J.Grand Rapids

‡ Kelly, Robert T.Grand Rapids

Kiesler, FrankGrand Rapids

† Kotchevar, Frank R.Sun City, CA

Kruger, E. LarryNashwauk

Law, Harrison E.Virginia

Leach, Thomas C.Hudson, WI

Lee, William C.Hibbing

Leih, George G.Virginia

Leino, Walter B. Jr.Ely

McClelland, John G.Virginia

McKenna, John J.Virginia

McKenna, Maurice J.Grand Rapids

Martinson, Raymond M.Virginia

Mast, Fredric L.Chisholm

Miettunen, John B.Hibbing

Miks, George M.Aurora

Miller, Harry G.Virginia

Mock, Charles J.Virginia

Moyer, Richard R.Hibbing

Mueller, Donald R.Grand Rapids

‡ Muller, John J.Hibbing

Murray, Robert A.Hibbing

Neff, Walter S.Britt

‡ Nelimark, D. RobertVirginia

Nelson, Bernette G.Ely

‡ Nollet, Donald J.Hibbing

Olson, Richard T.Virginia

Owens, Ben P.Hibbing

Paciotti, Vincent J.Hibbing

Parker, Wilbert H.Chisholm

Payne, Richard E.Virginia

Person, Duane F.Virginia

† Peterson, Edward N.Virginia

£ Pietan, Jerald H.Chisholm

Prlina, Isaac M.Virginia

Rayer, Anthony L.Babbitt

‡ Reed, PaulVirginia

Reynolds, Dermot F.Hibbing

Richter, David J.Virginia

‡ Roth, Albert H.Deer River

† Rowles, Everett K.Laguna Hills, CA

‡ Salter, Reginald A.Virginia

‡ Schirber, Martin J.Grand Rapids

Schweiger, Theodore R.Hibbing

Schwingamer, Thomas G.Ely

Sher, David A.Virginia

Siegel, John S.Virginia

† Sisler, Clifford E.Grand Rapids

Skumatz, Primus J. Jr.International Falls

*† Snyder, Omer E.Ely

Stein, Robert L.Chisholm

Stolen, Keith H.Grand Rapids

Strouth, Jonas C.Virginia

Summar, M. ThomasFridley

Swenson, Floyd J.Grand Rapids

Talsness, Jon M.International Falls

Tietz, Charles A.Virginia

Walker, Stuart B.Aurora

‡ Walter, Frederick H.International Falls

Weir, Mathew J.Virginia

‡ Werner, Donald L.Hoyt Lakes

Wheeler, Gilbert S.Virginia

‡ Woodruff, WhitneyVirginia

COUNTY MEDICAL SOCIETY ROSTER

RED RIVER VALLEY MEDICAL SOCIETY Kittson, Mahnomen, Marshall, Norman, Pennington, Polk, Red Lake and Roseau Counties Regular meetings, quarterly Annual meeting, December Number of members 52

PRESIDENT

Tharsgard, ErnestThief River Falls

SECRETARY

Berg, A. M.Thief River Falls
Behr, Orlo K.Crookston
† Berg, Arnold M.Thief River Falls
† Bratrud, EdwardAlexandria
Bray, Jerome L.Thief River Falls
† Brown, Glenn W.Halstad
† Brown, James R.Crookston
† Carter, Robert G.Thief River Falls
Choithani, C. M.Crookston
Choithani, H. C.Crookston
Clapp, Hubert D.Crookston
† Dagg, EarlThief River Falls
Davidson, Duane J.Thief River Falls
Delmore, JackRoseau
Dillenburg, CyrilCrookston
† Flancher, Leon H.Detroit Lakes
† Foderick, Peter P.Ada
Herber, LeoThief River Falls
Hirsh, StantonCrookston
Holmstrom, Carle H.Warren
Jensen, John A.Crookston
Kinkade, Byron R.Ada
† Klefstad, Lloyd H.Greenbush
† Kostick, William R.Fertile
† Larter, RolandHallock
† Loken, TheodoreAda
† Lynde, Orrin G.Los Gatos, CA

‡ Martin, George B.Thief River Falls
Melashenko, Kenneth W.Karlstad
Mercil C. B.Mahnomen
‡ Mercil, WilliamCrookston
Mersy, David J.Red Lake Falls
Montaniel, Necito L.Crookston
† Nelson, Henry E.Crookston
† Oppegaard, C. L.Scottsdale, AZ
‡ Parra, SamuelCrookston
‡ Pinsonneault, W. A.Roseau
† Roholt, Christian L.McIntosh
Reff, Alan R.Crookston
‡ Sather, Edgar L.Fosston
‡ Sather, George A.Fosston
† Sather, R. AlanBeaver Dam, WI
‡ Sather, Richard N.Fosston
Sather, Russell O.Crookston
Scheuneman, Allen F.Thief River Falls
Schnabel, Robert F.Crookston
Skogerboe, RudolphE. Grand Forks
Stadem, CliffordCrookston
Stewart, Donald E.Crookston
£ Taylor, Ross M.Thief River Falls
Thorbus, Ruben S.Karlstad
Thorsgard, Ernest O.Thief River Falls
Uhley, Charles G.Hopkins
‡ Van Rooy, George T.Thief River Falls
Wendi, PaulThief River Falls
Wikoff, Howard M.Crookston

RICE COUNTY MEDICAL SOCIETY

Rice County
Regular meetings, third Tuesday of
January, April, September and November
Annual meeting in November
Number of members 27

PRESIDENT

Gutzmann, Bruce F.Faribault

SECRETARY

Beaton, J. GordonNorthfield
Beaton, J. GordonNorthfield
† Buesgens, Ralph H.Waterville
Clarke, DeanFaribault
Faust, John H.Northfield
† Foni, Iancu F.Faribault
†† Francis, David W.Morristown
Good, Roy H.Northfield
† Graham, Asa B.Northfield
Gutzmann, Bruce F.Faribault
Haas, Jack F.Northfield
Halvorson, David C.Northfield

† Kennedy, George L.Faribault
† Kolars, James J.Faribault
Meyer, Frederick C.Kenyon
† Meyer, Paul F.Faribault
Meyer, Richard H.Faribault
Meyer, Robert P.Faribault
Nickerson, John R.Faribault
Orr, Burton A.Faribault
† Rumpf, Carl W.Faribault
Rysgaard, George N.Northfield
Smith, ThorstenTheills, NY
Speckhals, Robert C.Faribault
Street, BernardNorthfield
‡ Studer, Donald J.Faribault
† Traeger, Carl A.Faribault
Weaver, Paul H.Faribault

COUNTY MEDICAL SOCIETY ROSTER

ST. LOUIS COUNTY MEDICAL SOCIETY

Carlton, Cook, Lake and Southern portion of

St. Louis County

Regular meetings, second Thursday in each month
except July and August

Annual meeting, second Thursday in January

Number of members 181

PRESIDENT

Van Ryzin, Donald J.Duluth

SECRETARY

Wall, Jack E.Duluth

SECRETARY, EXECUTIVE OFFICE

Lundgren, Miss Margaret M.Duluth

† Abraham, Arden L.Duluth

† Ahrens, Curtis F.Duluth

† Anderson, James M.Duluth

Armin, David W.Two Harbors

† Asta, Joseph J.Duluth

† Athens, A. G.Santa Barbara, CA

† Atmore, William G.Duluth

† Aufderheide, Arthur C.Duluth

Backus, Byron C.Cloquet

† Backus, Lloyd B.Cloquet

† Backus, Reno W.Cloquet

† Bagley, Charles M.Duluth

Bagley, Elizabeth C.Duluth

† Bakkila, Henry E.Duluth

† Balmer, Albert I.Duluth

† Bartzen, Peter J.Duluth

† Becker, Frederic T.Duluth

† Bell, Harry M., Jr.Duluth

† Bepko, Marie (Puumala)Cloquet

† Bergan, Robert O.Duluth

† Berns, Max H.Duluth

†† Bianco, Anthony J.Duluth

† Bloom, JosephPompano Beach, FL

Blum, Clifford J.Duluth

† Boecker, BernhardDuluth

† Boman, Paul G.Duluth

† Boman, Peter L.Duluth

† Boyer, Samuel H.Duluth

† Bray, Philip N.Duluth

† Brooker, Warren J.Duluth

† Brown, Cyrus C., Jr.Duluth

† Buckley, Robert P.Duluth

Budd, Frank W.Duluth

† Bulluck, Matthew H.Duluth

† Butler, John K.Cloquet

Campbell, Craig W.Duluth

† Campaigne, Robert J.Duluth

† Carter, Robert E.Duluth

† Christensen, Clarence H.Duluth

Church, Gerald E.Two Harbors

Clark, Elizabeth A. (Mrs. Halbert)Duluth

*† Clark, Ivan T.Sun City, AZ

Clifford, Thomas M.Silver Bay

† Coll, James J.Duluth

† Collins, Roger T.Duluth

† Cotton, Gerald E.Duluth

† Coventry, William D.Duluth

† Cowan, Gary A.Duluth

Cowan, George M.Duluth

Cox, Milton J.Duluth

† Creps, James R.Duluth

† Cuderman, Bart S.Duluth

† Davidson, A. DaleDuluth

Davis, WilliamMoose Lake

† Deutsch, Robert J.Duluth

† Dickson, Franklin H.Proctor

† Dobbs, Richard L.Duluth

† Drexler, Charles J.Duluth

† Dwyer, John J.Duluth

£ Eckman, Matthew J.Minneapolis

† Eckman, Philip F.Duluth

† Eckman, Philip L.Duluth

† Eckman, Ralph J.Duluth

† Ecklund, Carl D.Duluth

† Emanuel, Karl W.Duluth

† Engelsgerd, Gerald L.Duluth

Evison, Emerson O.Duluth

† Fawcett, Keith R.Duluth

Feuling, John C.Sun City, AZ

† Fifield, Malcolm M.Duluth

† Fisketti, HenryDuluth

Frederickson, David L.Duluth

† Fuller, JosiahDuluth

†† Gillespie, Malcolm G.Duluth

† Goldish, Daniel R.Duluth

† Goldschmidt, VolkerDuluth

† Goodnow, William H.Duluth

† Gowan, Lawrence R.Duluth

† Gowan, Lawrence R., Jr.Duluth

† Gower, Walter E.Duluth

Griesy, Carl V.Two Harbors

† Grohs, William H.Duluth

Gronquist, Y. K. J.Cloquet

† Haase, Donald D.Silver Bay

† Haavik, John E.Duluth

† Halbert, John J.Duluth

† Halliday, Phillip V.Duluth

Hanson, Ernest O.Cloquet

† Harper, David G.Duluth

† Harrington, Vernon A.Duluth

† Hartzell, AllanDuluth

† Heisel, John G.Duluth

† Hilding, Anderson C.Duluth

Hoeg, Dwight C.Duluth

† Hoff, Herbert O.Duluth

† Holt, Glen E.Duluth

† Hood, Roderick P.Duluth

† Houglum, Arvid J.Duluth

† Houkom, S. SverreDuluth

† Hutchinson, HenryMinneapolis

Jacklin, Alexander J.Duluth

† Jacobson, Ferdinand C.Duluth

† Jacott, William E.Duluth

† Jeronimus, Henry J.Duluth

† Jewson, Douglas V.Duluth

† Jimenez, EdwardDuluth

† Johnson, Franklin L.Duluth

† Johnson, Karl E.Duluth

† Johnson, Theodore L.Duluth

† Juntunen, Roy R.Duluth

† Kilen, Mark B.Duluth

†† Klein, HarryDuluth

† Knoedler, John P.Duluth

Kosiak, WilliamSt. Paul

Kubista, Theodore P.Duluth

COUNTY MEDICAL SOCIETY ROSTER

St. Louis County Medical Society (Continued)

† Kundel, Donald W.	Duluth	† Reardon, Andrew E.	Duluth
† Kwako, Jerome E.	Duluth	† Reed, Henry H.	Duluth
† L'Abbe, A. J. Philip	Duluth	† Rowe, Richard G.	Duluth
† LaBree, Robert H.	Duluth	† Rudie, Peter S.	Duluth
† Langseth, Rodney N.	Duluth	† Rudie, William D.	Duluth
† Larson, Donald M.	Duluth	† Runquist, John M.	Duluth
† Larson, Kenneth R.	Moose Lake	† Ruth, Bradley R.	Duluth
† Latterell, Kenneth E.	Duluth	† Ryan, Edward A.	Duluth
† Leek, Joseph H.	Duluth	† Saloum, Lucille M.	Duluth
† Leonardson, Peter Y.	Silver Bay	† Sanford, John B.	Duluth
† Leppink, Harold B.	Two Harbors	† Sax, Milton H.	Duluth
† Leppo, N. Erkki A.	Duluth	† Schmid, John F.	Duluth
† Linnell, Leonard S.	Duluth	† Schneider, Lawrence E.	Duluth
† Litman, Samuel N.	Duluth	† Shirley, Raymond M.	Duluth
† Lundberg, Kay R.	Duluth	† Sjoding, Carl W.	Grand Marais
† Lundberg, Willard	Duluth	† Slack, William J.	Duluth
† McNutt, John R.	Duluth	† Smith, Cyril M.	Duluth
† MacDonald, Roger A.	Grand Marais	† Smith, Wallace R.	Grand Marais
† MacRae, Gordon C.	Duluth	† Spang, Anthony J.	Duluth
*† Magney, Fredolph H.	Duluth	† Spang, James S.	Duluth
† Martin, Webster C.	Duluth	† Spang, William M.	Duluth
† Maryland, Daniel L.	Duluth	† Spencer, Joseph F.	Duluth
† Mathers, John E.	Duluth	† Stein, William A.	Duluth
† Mattson, Roger A.	Duluth	† Stolee, Thomas A.	Duluth
† May, Horst G.	Duluth	† Storsteen, Kenneth A.	Duluth
† Mendesh, Anthony N.	Duluth	† Streitz, John M.	Duluth
† Merrick, William G.	Duluth	† Strewler, Gordon J.	Duluth
† Meyer, Howard J.	Duluth	† Swedberg, William A.	Duluth
† Michaelis, Dorothy	Duluth	† Swensen, Don P.	Duluth
† Moller, Julie C.	Duluth	† Swenson, Arnold O.	Duluth
† Mongé, James J.	Duluth	† Swenson, Orville P.	Cloquet
† Monserud, Nels O.	Cloquet	† Teich, Kenneth W.	McKeesport, PA
† Moyer, John B.	Duluth	† Terrell, Bernard J.	Nopemeng
† Munger, James E.	Duluth	† Tetlie, James P.	Duluth
† Munson, Martin S.	Moose Lake	† Thomas, John V.	Duluth
† Myers, Thomas T., III	Duluth	† Thompson, James I.	Duluth
† Nelson, John W.	Duluth	† Thurn, Roy J.	Duluth
† Nisius, George F.	Duluth	† Tosseland, Noel E.	Duluth
† Nisswandt, Albert L.	Duluth	† Tygart, Robert L.	Duluth
† Norberg, Carl E.	Los Altos, CA	† Ulrich, Emery E.	Duluth
† O'Neill, John C.	Duluth	† Van Druten, William A.	Duluth
† Parson, E. Irvine	Duluth	† Van Puffelen, Paul S.	Duluth
† Pasek, Antone W.	Cloquet	† Van Ryzin, Donald J.	Duluth
† Patch, Orien B.	Duluth	† Wahman, Robert E.	Duluth
† Peterson, John H.	Duluth	† Walder, Harold J.	Duluth
† Peterson, Norman P.	Duluth	† Wall, Jack E.	Duluth
† Pollard, William S.	Duluth	† Wallace, Martin O.	Duluth
† Power, John E.	Duluth	† Wells, Arthur H.	Duluth
† Puumala, Barbara M.	Cloquet	† Williams, Bruce F. P.	Duluth
† Puumala, Reino H.	Cloquet	† Wolfe, John W.	Duluth
† Puumala, Ricard R.	Cloquet	† Young, Hadley R.	Duluth

COUNTY MEDICAL SOCIETY ROSTER

SCOTT-CARVER COUNTY MEDICAL SOCIETY

Scott and Carver Counties

Regular meetings, first Wednesday of each month,
except July and August

Annual meeting in June

Number of members 42

PRESIDENT

Olson, Richard E.Chaska

SECRETARY

Amra, Waleed N.Chaska

Abrams, Donald J.Shakopee

Adams, Patrick J.Burnsville

Amra, WaleedChaska

Bean, Charles N.Waconia

Berg, John H.Montgomery

† Bratholdt, James W.Watertown

† Buck, Frederick H.Shakopee

† Cervenka, Charles F.New Prague

Cervenka, John D.New Prague

Clarke, John W.Waconia

Cowger, Robert C.Farmington

† Crislip, George D.Waconia

† Doherty, Elmer M.New Prague

Erickson, Robert L.Rosemount

Heagle, C. RussellWaconia

† Hebeisen, Milton B.Chaska

Heinz, IvyShakopee

† Heinzerling, Carl R.Chaska

†† Juergens, Herman M.Belle Plaine

† Kucera, Stanley T.Northfield

† Kuz, EugeneSavage

Larson, Leighton W.Savage

Lehmann, James D.Waconia

† Lehrer, Alfred J.Montgomery

† Lukk, OlafPrior Lake

† McDaniel, Samuel P.Lakeville

Mendiola, Ramon P., Jr.Waconia

† Nehring, JohnChaska

† Olson, Richard E.Chaska

Palattao, Augustin D., Jr.Waconia

† Pearson, Bror F.Shakopee

† Philip, David R.Watertown

† Pistulka, Rolland D.Chaska

Ponterio, James E.Shakopee

Provence, Cecil L.Waconia

Rieschl, Elizabeth K.Jordan

† Schimelpfenig, George T.Chaska

Spagnolo, Anthony A.Shakopee

Stahler, Paul A.Jordan

Wempner, Jon D.Waconia

†† Westerman, Alvin E.Montgomery

†† Westerman, Fred C.Montgomery

SIBLEY COUNTY MEDICAL SOCIETY

Sibley County

Regular meetings, 3rd Monday of Odd number months

Annual meeting in November

Number of members 5

PRESIDENT

Knoche, Harvey A.Gaylord

SECRETARY

Bergersen, DeanArlington

Bergersen, DeanArlington

Dysterheft, AdolphGaylord

† Kath, Reinhard H.Merrifield

Knoche, Harvey A.Gaylord

† Vener, John M.Arlington

SOUTHWESTERN MINNESOTA MEDICAL SOCIETY

Cottonwood, Jackson, Murray, Nobles, Pipestone and

Rock Counties

Regular meetings first Monday of each month

except June, July and August

Annual meeting, November

Number of members 53

PRESIDENT

Dokken, JamesWindom

SECRETARY

Boone, Ervin S.Luverne

† Bader, Jean L.Slayton

† Basinger, Harold P.Windom

†† Basinger, Homer P.Windom

† Beckering, Roland G.Edgerton

†† Benjamin, Walter G.Pipestone

† Birkemeyer, Eugene J.Worthington

† Blackwell, LeonardJackson

†† Bofenkamp, Ferdinand W.Luverne

† Boone, Ervin S.Luverne

Boyd, Frank E.Pipestone

† Carlson, John V.Westbrook

† Carlson, Lloyd E.Worthington

† Christiansen, Harold A.Jackson

† Dawson, Lorin D.Worthington

† Dokken, James H.Windom

† Doman, Victor W.Lakefield

† Faul, Bennie C.Worthington

† Fitch, Charles G.Worthington

† Glick, Dallas D.Mountain Lake

Hallin, Roger P.Worthington

†† Halloran, Walter H.Jackson

† Halpern, David J.Brewster

† Harrison, Percy W.Worthington

† Hegstad, Thomas C.Windom

† Heiberg, O. M.Worthington

† Keyes, Robert W.Pipestone

†† Kilbride, Edwin A.Worthington

COUNTY MEDICAL SOCIETY ROSTER

Southwestern Minnesota Medical Society (Continued)

† Kim, Kyoung	Worthington
† Kotval, Russell J.	Pipestone
† Laikola, Leslie A.	Adrian
† Lohmann, John G.	Pipestone
† Lyon, Larry E.	Luverne
† Minge, Raymond K.	Worthington
† Mork, John N.	Worthington
† Nealy, Donald E.	Adrian
† Nywall, Dean D.	Slayton
† Odland, Donald M.	Luverne
† Olson, David E.	Worthington
† Patterson, Hugh D.	Slayton
† Pierson, Roy F.	Slayton

† Plucker, Milton W.	Worthington
† Rud, Paul D.	Luverne
† Ryding, Vincent	Fargo, ND
† Schade, Frederick	Santa Cruz, CA
† Seisler, Edward P.	Worthington
† Siebert, Darrel W.	Luverne
† Stam, John	Worthington
† Strand, Jack W.	Jasper
† Stratte, Harold C.	Windom
† Strough, LaVern C.	Worthington
† Wells, Walter B.	Jackson
† Wiens, Alvin L.	Mountain Lake
† Williams, Charles A.	Seattle, WA

STEARNS-BENTON COUNTY MEDICAL SOCIETY

Stearns and Benton Counties

Regular meetings, third Thursday of each month

Annual meeting, January

Number of members 110

PRESIDENT

Olinger, JohnSt. Cloud

SECRETARY

Espelian, Alan D.St. Cloud

SECRETARY, EXECUTIVE OFFICE

Anderson, Mrs. Joyce E.St. Cloud

† Alden, Charles W.Sauk Rapids

† Aulick, Ernest J.Paynesville

† Autrey, William A.St. Cloud

† Ballantine, Jerome J.St. Cloud

† Bancroft, Burton R., Jr.St. Cloud

† Bauman, John C.Foley

† Baumgartner, Florian H.Albany

† Belshe, Joseph St. Cloud |

† Berger, Phil R.St. Cloud

† Bozanich, Milosh S.St. Cloud

† Brattensborg, Henry J.St. Cloud

† Brigham, Charles F., Jr.St. Cloud

† Broker, Henry M.St. Cloud

† Brown, Frank T.St. Cloud

† Cesnik, Robert J.Sauk Rapids

† Chawla, Ramesh C.Milaca

† Clark, Harry B.St. Cloud

Courteau, Robert D.Rodesia, Africa

† Cress, Thomas L.St. Cloud

† Cumming, Robert J.St. Cloud

† Dahlquist, LaRue V.St. Cloud

† Donaldson, Charles S.St. Cloud

† Dubois, Julian F.Sauk Centre

† Dziubinski, Emil H.St. Cloud

† Ehlen, Charles P.St. Cloud

Espeland, L. MichaelBellevue, NB

† Espelian, Alan D.St. Cloud

† Evans, Leslie M.Sauk Rapids

† Gaida, Joseph B.St. Cloud

† Gerstenkorn, George B.Milaca

† Goehrs, Gilman H.St. Cloud

† Gonzales, Neva M.St. Cloud

† Grant, John C.Sauk Centre

† Halenbeck, Philip L.St. Cloud

† Harbaugh, John T.St. Cloud

† Heckman, Donald C.St. Cloud

† Held, William J.St. Cloud

† Henry, Clarence J.Onamia

† Henry, Joseph E.Milaca

† Hobday, H. ThomasSt. Cloud

Hughes, Bernard J.St. Cloud

† Hutchinson, HenryMinneapolis

† Iverson, Jerry A.St. Cloud

† Jaeger, Dwight E.St. Cloud

† John, Byron L.St. Cloud

† Johnson, William E.St. Cloud

† Jones, Richard N.St. Cloud

† Keith, Paul J.Milaca

† Kelly, James H.St. Cloud

† Kelly, John F.Cold Spring

† Koenig, Robert P.St. Cloud

† Koop, Severin H., Jr.St. Cloud

† Krulich, Stephen J.St. Cloud

† Kuhlmann, Lawrence B.Melrose

† Kvistberg, Gerald K.St. Cloud

† LaFond, Edward M.St. Cloud

† Lenarz, Albert J.St. Cloud

† Lindeman, Raymond J.Paynesville

† Loeb, George L.St. Cloud

† Loes, Louis, A.St. Cloud

† Luby, Thomas H.St. Cloud

† Lyons, John R.St. Cloud

† McDowell, John P.St. Cloud

† McNamara, John P.Rice

† May, Robert B.St. Cloud

† Milhaupt, Emmett N.Dunedin, FL

† Moran, Paul T.St. Cloud

† Mueller, Rudolph B.Richmond

† Murn, Thomas G.St. Cloud

† Murray, Robert A., Jr.St. Cloud

† Myre, Clifford R.Paynesville

† Neils, Vernon E.St. Cloud

† Nietfield, Aloys B.Sauk Centre

† O'Keefe, James P.St. Cloud

† Olinger, John N.St. Cloud

† Osterras, GraysonSt. Cloud

† Park, Myung C.St. Cloud

† Petersen, Robert T.St. Cloud

† Phares, Otto C.St. Cloud

† Raetz, Sylvester J.Maple Lake

† Ranson, H.St. Cloud

† Rice, William H.St. Cloud

† Richards, William B.St. Cloud

† Ritchie, Donald A.St. Cloud

† Rovelstad, Roger A.St. Cloud

Continued on next page

JULY 1973

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COUNTY MEDICAL SOCIETY ROSTER

Stearns-Benton County Medical Society (*Continued*)

‡ Rozycki, Anthony T. ....St. Cloud	‡ Stiles, Clifford D. ....Foley
Salk, Richard J. ....Albany	‡ Thienes, R. Lawrence ....St. Cloud
Savelkoul, Gene R. ....Belgrade	‡ Thuringer, Carl B. ....St. Cloud
Scanlon, Timothy N. ....Melrose	‡ Urbanyi, Eugene W. ....St. Cloud
Schamber, Walter ....St. Cloud	‡ Vanderpool, Thomas E. ....Paynesville
‡ Schlorf, Richard A. ....St. Cloud	‡ Van Nostrand, David M. ....St. Cloud
‡ Schmitz, Everett J. ....St. Cloud	‡ Veranth, Leonard A. ....St. Cloud
‡ Sisk, Harvey E. ....St. Cloud	‡ Warner, Paul L. ....St. Cloud
‡ Slanga, Roger A. ....St. Cloud	‡ Wenner, Waldemar T. ....St. Cloud
‡ Smith, J. Weston ....St. Cloud	‡ Williamson, Kenneth R. ....St. Cloud
‡ Sommers, Stephen D. ....St. Cloud	‡ Windschitl, Harold E. ....St. Cloud
‡ Stahn, Louis H. ....St. Cloud	‡ Wittrock, Louis H. ....St. Cloud
	† Zachman, Albert H. ....Melrose
	‡ Zeleny, Joseph H. ....St. Cloud

STEELE COUNTY MEDICAL SOCIETY

Steele County

Regular meetings, third Tuesday January, March, May,

September and November

Annual meeting, November

Number of members 22

PRESIDENT

deWerd, RobertOwatonna

SECRETARY

Benjamin, R. J.Owatonna

‡ Anderson, Franklin C.Owatonna

Arnesen, John F.Owatonna

Benjamin, Roger J.Owatonna

‡ Buresh, Kenneth L.Owatonna

‡ deWerd, Robert W.Owatonna

Dewey, Donald H.Owatonna

Floersch, Adrian J.Owatonna

Glass, David E.Owatonna

‡ Halvorsen, Daniel K.Owatonna

Hartung, Elmer H.Claremont

‡ Henry, John C.Owatonna

‡ Henry, Kenneth, G.Owatonna

‡ Hilker, Robert T.Owatonna

Honath, Donald H.Owatonna

Kulstad, Oscar S.Dodge Center

‡ Lundquist, Curt W.Owatonna

McEnaney, James E.Owatonna

† McIntyre, John A.Owatonna

† Morehead, Dewey E.Faribault

Nealy, Timothy E.Blooming Prairie

‡ Olson, Albert J.Owatonna

† Roberts, Oliver W.Owatonna

† Schaefer, Joseph F.Sun City, AZ

† Stransky, Theodore W.Owatonna

† Wilkowske, Rudolph J.Owatonna

UPPER MISSISSIPPI MEDICAL SOCIETY

Aitkin, Cass, Crow Wing, Hubbard, Morrison, Todd &

Wadena Counties

Regular meetings, January, April, September

Annual meeting, January

Number of members 78

PRESIDENT

Heid, James K.Little Falls

SECRETARY

Anderson, Arden O.Brainerd

‡ Aga, John H.Brainerd

‡ Anderson, Arden O.Brainerd

Belcher, Royden A.Little Falls

*‡ Bender, James H.Brainerd

‡ Bissinger, Lester L.Brainerd

Brown, Russell T.Browerville

Burman, Richard E.Aitkin

Cardle, George E.Brainerd

Churchill, JanePark Rapids

Closuit, Frederick C.Aitkin

‡ Coombs, Carl H.Cass Lake

‡ Crow, Earl R.Minnetonka

† Davis, Lloyd T.Wadena

Davis, Luther F.Wadena

* Dimmick, Ivan C.Brainerd

‡ Dodson, Albertus F.Brainerd

Doty, JosephLittle Falls

† Erickson, Alvin O.Long Prairie

‡ Fitzsimons, William E.Brainerd

Fortier, George M. A.Little Falls

Fortier, George M. A., Jr.Little Falls

‡ Gamm, Edgar R.Park Rapids

† Ghostley, Mary C.Bemidji

Grimes, Paul T.Park Rapids

† Grose, Frederick N.Clarissa

Halme, William B.Wadena

Hansen, Milo L.Little Falls

Heid, James K.Little Falls

Jacobson, Dennis R.Onamia

‡ Johnson, Douglas L.Brainerd

‡ Kanne, Earl R.Brainerd

Kelley, Roger E.Crosby

Knipp, William J.Brainerd

†‡ Knoll, W. V.Brainerd

Kohls, Gary G.Milaca

‡ Kussy, James C.Little Falls

Larson, Donald R.Crosby

‡ Larson, Theodore G.Brainerd

†‡ Lee, Hubert W.Brainerd

Lelwica, Thaddeus J.Staples

Lofstrom, DennisBrainerd

Longfellow, Helen W.Brainerd

† Lund, Werner J.Staples

†‡ McLane, William O.Brainerd

Marshall, Clark M.Crosby

COUNTY MEDICAL SOCIETY ROSTER

Upper Mississippi Medical Society (Continued)

‡ Marvin, Joseph E.	Brainerd
‡ Meller, Maurice	Brainerd
‡ Mennis, William I.	Staples
Montgomery, Guy E.	Park Rapids
Mortenson, Howard O.	Menahga
† Mosby, Maurice E.	Long Prairie
Muesing, Mark A.	Brainerd
* Mulligan, Arthur M.	Brainerd
‡ Muus, John H.	Staples
Ness Duane E.	Wadena
Nixon, James B.	Crosby
* Nordberg, Robert J.	Little Falls
Olson, Lillian A.	Ah-Gwah-Ching
Parker, Warren E.	Sebeka
‡ Pedersen, Robert L.	Brainerd
‡ Pelzl, Charles R.	Pine River
† Petraborg, Harvey T.	Aitkin
£ Petterson, George R.	Los Angeles, CA

Poppie, Robert W.	Brainerd
* ‡ Reichelderfer, Charles	Staples
‡ Reichelt, Leland G.	Wadena
Ringle, Otto F.	Walker
Scanlon, Hugh A.	Little Falls
Schmitt, Tim B.	Browerville
Schulberg, Verne A.	Minneapolis
Seifert, Donald R.	Little Falls
Soriano, Dominador B.	Onamia
Sosey, Walter K.	Crosby
Spieker, F. B.	Pequot Lakes
† ‡ Stein, Raymond J.	Pierz
Stoy, Robert A.	Little Falls
‡ Thompson, V. James	Staples
‡ Vandersluis, Charles W.	Minneota
‡ Watson, Sidney W.	Little Falls
‡ Westley, Kent F.	Little Falls
Wiger, Oliver E.	Little Falls
Williams, Mervyn M.	Ah-Gwah-Ching
Witter, Robert L.	Wadena

WABASHA COUNTY MEDICAL SOCIETY

Wabasha County

Regular meetings, special call

Annual meeting first Thursday after first Monday in
October

Number of members 10

PRESIDENT

Sontag, David W. Lake City

SECRETARY

Bowers, R. N. Lake City

‡ Bouquet, Bertram J. Wabasha

‡ Bowers, Robert N. Lake City

‡ Ellis, Earl W. Elgin

‡ Feigal, Gary R. Lake City

‡ Gjerde, William P. Lake City

† Habein, Harold C. Palo Alto, CA

‡ Mahle, Donald G. Wabasha

Moline, Doreen Martin Pepin, WI

‡ Sontag, David W. Lake City

‡ Timm, Marvin E. Wabasha

WAKOTA MEDICAL SOCIETY

Washington and Dakota Counties

Regular meetings second Tuesday in each month

Annual meeting, June

Number of members 35

PRESIDENT

Hunter, Murray Farmington

SECRETARY

Peikert, Carl Forest Lake

‡ Bealka, Neil Stillwater

† Bonello, Frank West St. Paul

† Brabec, Paul F. Hastings

Canine, James L. So. St. Paul

Dale, Les N. Hastings

‡ deLeon, Ben Stillwater

‡ Diessner, Ardell W. Stillwater

† Eiden, Vera M. Palo Alto, CA

Fasbender, Herman T. Hastings

Foderick, John W. Hastings

† Holcomb, Joel T. Marine-on-the-St. Croix

Hunter, Murray H. Farmington

‡ Jenson, James E. Stillwater

‡ Johnson, O. Guy St. Paul

† Just, Herman J. Hastings

‡ Kiolbasa, Edward B. Stillwater

‡ McCarten, Francis M. Stillwater

‡ Midboe, Gilbert T. Forest Lake

‡ Murphy, Thomas R. Stillwater

Paguyo, Nelson So. St. Paul

Peikert, Carl F. Forest Lake

£ Peterson, John O. H. Hastings

‡ Quinn, Paul Stillwater

Reid, James W. So. St. Paul

Ruggles, George M. Forest Lake

‡ Sandkamp, Virgil So. St. Paul

‡ Schulz, Jerome E. Stillwater

Schwartz, Carl Hastings

Setnee, Peter Forest Lake

† Sherman, Carnot H. Bayport

‡ Stratte, Jon R. Stillwater

† Van Meier, Henry Stillwater

Weiss, Carl A. Hastings

Zeller, Hector Hastings

WASECA COUNTY MEDICAL SOCIETY

Waseca County

Regular meeting, January

Annual meeting, January

Number of member 8

PRESIDENT

Olds, George H. New Richland

SECRETARY

Dey, James W. Waseca

Davis, Raymond D. Stockton, CA

‡ Dey, James W. Waseca

‡ Hergott, Patrick Waseca

‡ Hottinger, Raymond C. Janesville

‡ Normann, Stephen T. Waseca

‡ Oeljen, S. C. G. Waseca

‡ Olds, George H. New Richland

‡ Pope, David A. Janesville

COUNTY MEDICAL SOCIETY ROSTER

WEST CENTRAL MINNESOTA MEDICAL SOCIETY

Big Stone, Pope, Stevens and Traverse Counties
Regular meetings, third Tuesday in March, May,
September and November
Annual meeting, November
Number of members 21

PRESIDENT

Rossberg, R. A. Morris

SECRETARY

Popoff, Russel G. Graceville
£ Benjamin, Charles I. St. Paul
† Bergan, Otto Clinton
†‡ Bucher, Foster D. Starbuck
£ Christenson, Carl E. New Brighton
Colago, Victor M. Browns Valley
Eide, O. A. Hancock
Hedemark, Homer H. Ortonville
† Hedemark, Truman A. Ortonville
Karn, Jacob F. Ortonville

Knip, Robert J. Ortonville
Kolp, Berton A. Glenwood
Kooda, Jennings C. Morris
Kozel, William J. Morris
Lee, Gordon E. Glenwood
Merrill, Robert Des Moines, IA
‡ Pettko, Joseph Wheaton
Poole, James Wheaton
‡ Popoff, Russel G. Graceville
‡ Rossberg, Raymond A. Morris
Watson, Robert M. Morris
Zempel, Alan R. Starbuck

WINONA COUNTY MEDICAL SOCIETY

Winona County
Regular meetings, second Tuesday in January, April,
July and October
Annual meeting, January
Number of members 40

PRESIDENT

Andersen, Horace Winona

SECRETARY

Heise, Herbert vR. Winona
‡ Andersen, Horace J. Winona
† Boardman, Dalmon V. Greeley, CO
Bunnell, Harris F. Winona
‡ Caspersen, Tom Winona
†‡ Christensen, Eli E. Winona
‡ Degallier, Daniel Winona
‡ Edin, Andrew E. Winona
‡ Fenske, Arnold Winona
‡ Garber, George L. Winona
‡ Haesly, Warren W. Winona
‡ Hartwich, Roger F. Winona
‡ Hawk, Dale J. St. Charles
Heise, Carl vR. Winona
‡ Heise, Herbert vR. Winona
‡ Heise, Paul vR. Winona
‡ Heise, Philip vR. Winona
Heise, William vR. Winona
‡ Herland, Alexander L. Winona
Hick, John F. Winona

‡ Hughes, Sidney O. Winona
‡ Johnson, Curtis M. Winona
‡ Johnston, Leonard Winona
‡ Loomis, George L. Winona
† Meinert, Albert E. Winona
Miller, Linda K. Winona
‡ Mulrooney, John G. Winona
‡ Peterson, John R. Rushford
‡ Roemer, Henry J. Winona
‡ Rogers, Charles W. Winona
‡ Schafer, Charles F. Winona
† Schmidt, Hilmar R. Winona
Stewart, Richard O. Winona
‡ Testor, James V. Winona
‡ Tweedy, John A. Winona
‡ Tweedy, Robert B. Winona
‡ Vieiraves, G. M. Winona
‡ Weiss, Joseph E. Winona
‡ Wilmot, Thomas M. Winona
Wilson, L. J. Rushford
† Wilson, R. H. Winona
†‡ Younger, Lewis I. Winona

WRIGHT COUNTY MEDICAL SOCIETY

Wright County
Regular meetings, first Tuesday of every other month
Annual meeting in November
Number of members 14

PRESIDENT

Sandeen, Robert M. Buffalo

SECRETARY

Shin, Rok Howard Lake
‡ Anderson, Waldo P. Buffalo
†‡ Bendix, Lester H. Annandale
‡ Cady, Timothy J. Buffalo
‡ Catlin, Theodore J. Buffalo
*†‡ Ellison, Frank E. Monticello
Greenfield, Theodore Champlin
‡ Guilfoile, Pierre J. Delano

†‡ Hart, William E. Monticello
‡ Ourada, Anthony L. Maple Lake
‡ Purves, G. Harland Buffalo
‡ Sandeen, Robert M. Buffalo
‡ Shin, Rok Howard Lake
‡ Smorstok, Matthew B. Monticello
Steiner, Andrew M. St. Michael
†‡ Thielen, R. D. New Brighton
‡ Whitesell, L. A., Jr. Buffalo
‡ Zapf, John D. Monticello

COUNTY MEDICAL SOCIETY ROSTER

ZUMBRO VALLEY MEDICAL SOCIETY
Olmsted, Houston, Fillmore and Dodge Counties
Regular meetings, first Wednesday of every
odd-numbered month
Annual meeting, November
Number of members 894

PRESIDENT

Tyce, Francis A. Rochester

SECRETARY

Ahmann, David L. Rochester

EXECUTIVE SECRETARY

Fricke, Robert E. Rochester

ASSOCIATE DIRECTOR

Jackman, Raymond J. Rochester

† Aaro, Leonard A. Rochester

£ Abboud, Charles F. Rochester

£ Abboud, Nabil Rochester

£ Adams, Richard Rochester

† Adson, Martin A. Rochester

† Affeldt Daniel E. Kasson

£ Aguilo, Juan J. Rochester

† Ahlfs, Jacob J. Minnetonka

† Ahmann, David L. Rochester

£ Alvarez, Marcos N. Rochester

† Allen, George Rochester

£ Allred, Howard W., Jr. Rochester

† Andersen, Howard A. Rochester

† Anderson, Carl F. Rochester

£† Anderson, James A. Rochester

† Anderson, Mark J. Sun City, AZ

† Anderson, Markham J., Jr. Rochester

Anderson, Michael D. FPO, San Francisco, CA

† Anderson, Milton W. Rochester

£ Anderson, Richard D. Rochester

† Andreini, Paul H. Rochester

£ Angelini, Corrado I. Rochester

£ Anthony, Richard R. Rochester

Applestein, Bruce Rochester

£ Ascough, Bruce M. Panorama City, CA

Baars, Conrad Rochester

£ Bachand, Romeo T., Jr. Rochester

£ Bacnynsky, Nicholas Rochester

† Baggenstoss, Archie H. Rochester

Bailly, Richard C. Rochester

† Bair, Hugo L. Camp Lejeune, NC

Baird, Raymond L. Reno, NV

¶ Bajec, Dusan Belgrade, Yugoslavia

†† Baker, George S. Rochester

*† Baker, Harry R. Hayfield

† Baker, Hillier L., Jr. Rochester

£ Baker, Robert B. Rochester

Balfour, William M. Lawrence, KS

† Banfield, Frederick D. Rochester

† Banner, Edward A. Rochester

Baran, Ernest M. San Francisco, CA

£ Barnes, Nicholas D. Rochester

£ Barrett, David M. Rochester

£ Barrington, Bert Rochester

£ Barron, Stephen E. Rochester

† Barry, Maurice J., Jr. Rochester

† Bartholomew, Lloyd G. Rochester

£ Bartizal, Fred J. Rochester

£ Baumer, Robert J. Rochester

† Bayrd, Edwin D. Rochester

† Beabout, John W. Rochester

† Behrs, Oliver H. Rochester

Bechamps, Gerald J. Winchester, VA

Beckenbaugh, Robert D. Ft. Hood, TX

£ Becker, Paul W. Rochester

£ Beckerman, Stephen B. Rochester

£ Beckley, James M. Rochester

£ Beekler, Donald C. Rochester

Behrs, Oliver Rochester

† Belau, Paul G. Rochester

£ Belcher, Darrell C. Rochester

† Bennett, Clayton J. Rochester

£ Benson, Ralph C., Jr. Rochester

† Berge, Kenneth G. Rochester

£† Berkman, John M. Rochester

£ Bernstein, Sidney S. Rochester

£ Berquist, Thomas H. Rochester

£ Bertagnoll, Alfred P. Rochester

£ Beyerlein, Charles R. Rochester

† Bianco, Anthony J., Jr. Rochester

† Bickel, William H. Rochester

† Bisel, Harry F. Rochester

† Black, B. Marden Rochester

† Black, Leo F. Rochester

£ Black, Steven B. Rochester

£ Blanco-Benavides, Roberto Rochester

£ Bocala, Romeo R. Rochester

£ Bodell, Leonard S. Rochester

£ Boren, Gregory G. Rochester

£ Born, Michael P. Rochester

£† Boyd, David A., Jr. Rochester

£ Braasch, William F. Rochester

† Brandenburg, Robert O. Rochester

Breadon, George E. Rochester

Breivis, James S. Spokane, WA

£ Brewster, Robert C. Rochester

£ Briddell, Dennis M. Rochester

Brodhun, John C. Rochester

† Brown, Alex E. Bradenton, FL

† Brown, Arnold L. Rochester

† Brown, Henry A. Rochester

† Brown, Joe R. Rochester

£† Brown, Philip W. Rochester

† Brown, Philip W., Jr. Rochester

£ Brown, Robert S. Rochester

Brown, Stephen R. Rochester

£ Brown, Warwick L. Rochester

† Brubaker, Richard F. Rochester

£ Bruner, Kenneth W., Jr. Rochester

† Bryan, Richard S. Rochester

£ Brzica, Stephen M., Jr. Rochester

¶ Buchholz, Roger M. Rochester

£ Buie, Louis A. Rochester

† Burgert, E. O., Jr. Rochester

† Burich, Harry F. Rochester

† Burke, Edmund C. Rochester

£ Burns, John T. Rochester

Bush, David J. Biloxi, MI

† Butt, Hugh R. Rochester

£ Buza, Robert C. Rochester

£ Buzanowski, Krystayna Rochester

£ Byer, David E. Rochester

† Cain, James C. Rochester

† Callahan, John A. Rochester

£ Callaway, Clifford W. Rochester

† Cameron, Alan J. Rochester

£ Campa, Herman K. Rochester

† Campbell, Donald C. Rochester

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Zumbro Valley Medical Society (Continued)

£ Campbell, John T.	Rochester	‡ DeRemee, Richard A.	Rochester
‡ Campbell, Malcolm K.	Rochester	£ Derbenwick, Kenneth P.	Rochester
£ Cannon, Patrick J.	Rochester	£ Derbenwick, Mary Jane	Rochester
‡ Carlson, Harley C.	Rochester	‡ DeSanto, Lawrence W.	Rochester
£ Carlson, Richard A.	Rochester	‡ Devine, Kenneth D.	Rochester
Carney, Francoise M. T.	Rochester	Devloo, Robert A.	Rochester
£ Carpenter, Paul C.	Rochester	‡ DeWeerd, James H.	Rochester
Carr, David T.	Rochester	Didier, Edward P.	Rochester
‡ Carryer, Haddon M.	Rochester	£ Diaz-Buxo, Jose A.	Rochester
‡ Carter, Earl T.	Rochester	‡ Diessner, G. Roy	Rochester
£ Carter, M. Gary	Rochester	Dines, David E.	Rochester
£ Chesebro, James H.	Rochester	£ Djalilian, Mohsen	Rochester
£ Chiavetta, Stephen V., Jr.	Rochester	¶ Dobbins, Ronald V.	Rochester
Childs, Donald S. Jr.	Rochester	‡ Dobyns, James H.	Rochester
£ Chidlow, Judd H.	Rochester	‡ Dockerty, Malcolm B.	Rochester
‡ Childs, Donald S., Jr.	Rochester	£ Donoghue, Edmund R., Jr.	Rochester
£ Christensen, Robert D.	Rochester	‡ Donoghue, Francis E.	Rochester
‡ Christensen, Norman A.	Rochester	‡ Douglass, Bruce E.	Rochester
‡ Christiana, Richard L.	Rochester	£ Downey, Gale T.	Rochester
# Chumbley, Lee C.	Patuxent, MD	Doyle, James R.	Rochester
£ Chychota, Norman N.	Rochester	£ Dozois, Roger R.	Edinburgh, Scotland
£ Citron, Joseph	Rochester	£ Drijanski, Ruben	Rochester
† Clark, Edward C.	San Francisco, CA	£ Driscoll, Thomas P.	Rochester
† Clark, Leslie W.	Manchester, IA	† Drips, Della G.	Rochester
‡ Cody, D. Thane	Rochester	‡ Duane, Drake D.	Rochester
£ Cody, Michael C.	Rochester	£ DuBoff, Stuart M.	Rochester
£ Cofield, Robert H.	Rochester	£ DuBois, David D.	Rochester
£ Cohen, Manley	Long Beach, CA	£ Dukes, Russell J.	Rochester
‡ Colby, Malcolm Y., Jr.	Rochester	£ Dumesnil, Jean G.	Rochester
# Coleman, Robert L.	Whiteman, AFB, MO	£ Dunn, John S.	Rochester
£ Collins, Eugene	Rochester	£ Dupree, Emmett L., Jr.	Rochester
£ Colville, David S.	Rochester	‡ Dyck, Peter J.	Rochester
£ Conley, Dean R.	Rochester	‡ Dyer, John A.	Rochester
£ Conn, Richard L.	Rochester	£ Egan, Ernest L.	Rochester
*†‡ Cook, Edward N.	Rochester	†‡ Elkins, Earl C.	Rochester
£ Cooke, Nelson R.	Rochester	£ Elliott, Charles M.	Rochester
£ Cooney, William P., III	Rochester	£ Ellingsen, Norman H.	Rochester
£ Cooper, George IV	Rochester	Emerson, Robert K.	Rochester
‡ Cooper, Talbert	Rochester	†‡ Emmett, John L.	Rochester
# Cooperman, Avram M.	Wichita Falls, TX	Emmons, Patricia R.	Vancouver, Canada
† Corbin, Kendall B.	Rochester	Emmons, William F.	Sacramento, CA
‡ Corrigan, Cyril J.	Rochester	‡ Emslander, Richard F.	Rochester
£ Cortese, Denis A.	Rochester	# Engelberg, Jerry	Fairfield, CA
‡ Coventry, Markham B.	Rochester	‡ Engel, Andrew G.	Rochester
£ Crout, James E.	Rochester	£ Engels, Edward P.	Lexington, KY
£ Crow, Joe W.	Rochester	‡ Erich, John B.	Rochester
£ Crowder, David F.	Rochester	‡ Erickson, Donald J.	Rochester
‡ Culp, Clyde E.	Rochester	‡ Espinosa, Raul E.	Rochester
‡ Culp, Ormond S.	Rochester	# Ettinger, David S.	Ft. Leavenworth, KS
Cupps, Roger E.	Rochester	£ Etzell, Paul S.	Rochester
‡ Dahlin, David C.	Rochester	‡ Faber, John E.	Rochester
‡ Dale, Allan J. D.	Rochester	‡ Facer, George W.	Rochester
£ Daly, Dennis E.	Rochester	£ Falcone, James	Rochester
£ Daniel, Britt T.	Rochester	Farber, John E.	Rochester
£ Dorgaville, Richard M.	Rochester	£ Farrell, Kenneth H.	Rochester
‡ Daugherty, Guy W.	Rochester	†‡ Faulconer, Albert, Jr.	Rochester
£ Daugherty, Thomas W.	Rochester	# Fay, Thomas M.	Oakland, CA
£ Dauphine, Richard T.	Rochester	Feist, Donald J.	Rochester
£ Davidson, Michael J.	Rochester	Feldmann, Floyd M.	Lighthouse Point, FL
† Davis, Austin C.	Pompano Beach, FL	‡ Ferguson, Richard H.	Rochester
£ Davis, David L.	Rochester	†‡ Ferris, Deward O.	Rochester
‡ Davis, George D.	Rochester	£ Filbuch, Eugene E.	Rochester
‡ Dearing, William H.	Rochester	# Fink, Lawrence H.	Silver Springs, MD
¶ DeBus, Robert L.	Rochester	£ Fink, Richard A.	Rochester
‡ Decker, David G.	Rochester	£ Fiore, Joseph P.	Rochester
£ De Courcy, Donald M., Jr.	Rochester	‡ Fish, Charles R.	Rochester
£ Deering, Timothy B.	Rochester	£ Fitzgerald, Robert H., Jr.	Rochester
£ DeMeester, Lee J.	Rochester	£ Fitzpatrick, Patrick J.	Rochester
		# Flanigan, Donald J.	Pensacola, FL
		# Flick, William F.	Cheyenne, WY

COUNTY MEDICAL SOCIETY ROSTER

Zumbro Valley Medical Society (Continued)

£	Folger, Walter N.	Rochester
‡	Fontana, Robert S.	Rochester
£	Fordyce, Norman A.	Rochester
£	Forgacs, Pierre	Rochester
†	Foss, Edward L.	Condon, MT
‡	Foulk, William T., Jr.	Rochester
£	Fraser, Richard A.	Rochester
£	Freeman, Richard E.	Rochester
£	Freshman, John R.	Rochester
‡	Frethem, Allen A.	Rochester
†	Fricke, Robert E.	Rochester
£	Frytak, Stephen	Rochester
‡	Furlow, William L.	Rochester
£	Fuster, Valentin	Rochester
£	Gall, Randall J.	Rochester
‡	Gambill, Carl M.	Rochester
†‡	Gambill, Earl E.	Rochester
‡	Garber, James J.	Rochester
£	Gard, Joseph R.	Rochester
#	Garrick, James G.	Bethesda, MD
‡	Gastineau, Clifford F.	Rochester
‡	Gedge, Stafford W.	Rochester
‡	Geraci, Joseph E.	Rochester
£	Gibbs, Marvin K.	Rochester
£	Gifford, William A.	Rochester
#	Gildersleeve, John W.	Corte Madera, CA
£	Gillespie, Donald N.	Rochester
£	Gilsanz, Vicente	Rochester
£	Gismondi, Pedro A.	Rochester
‡	Gisvold, John J.	Rochester
£	Goellner, John R.	Rochester
‡	Goldstein, Norman P.	Rochester
‡	Goldston, Edgar C.	Rochester
£	Goldyne, Marc Ellis	Rochester
‡	Good, C. Allen, Jr.	Rochester
†	Goodenow, Thomas J.	Rochester
‡	Gorman, Colum A.	Rochester
‡	Gould, Allan B., Jr.	Rochester
£	Gould, Barry K.	Rochester
£	Gould, Daniel B.	Rochester
#	Gould, Ronald J.	Anchorage, AL
‡	Grabow, Jack D.	Rochester
‡	Graf, John A.	Rochester
‡	Gravett, Desmond C.	Rochester
‡	Green, Paul A.	Rochester
‡	Greene, Laurence F.	Rochester
£	Greipp, Philip R.	Rochester
#	Greydanus, Donald E.	Hawthorne, NJ
‡	Groover, Robert V.	Rochester
‡	Gross, John B.	Rochester
‡	Grubbs, Larry T.	Rochester
£	Guay, André T.	Rochester
£	Guller, Barbara	Rochester
£	Gura, George M., Jr.	Rochester
£	Gyory, Attila N.	Rochester
‡	Hagedorn, Albert B.	Rochester
‡	Hahn, Richard G.	Rochester
†‡	Haines, Samuel F.	Rochester
†	Hallberg, Olav E.	Rochester
£	Halpin, John A.	Rochester
‡	Hancock, William E.	Rochester
‡	Hanlon, David G.	Rochester
£	Hanson, Ernest J., Jr.	Rochester
‡	Hanson, Norbert O.	Rochester
¶	Hanson, Phyllis	Rochester
£	Harder, Edward J.	Rochester
†‡	Hargraves, Malcolm M.	Rochester
†	Harrington, Stuart W.	Rochester
‡	Hartfield, James E., Jr.	Rochester

¶	Hartmann, Ronald J.	Rochester
¶	Hauff, Karen J.	Rochester
#	Hayashi, Melvin M. K. W.	Belleville, IL
‡	Hayles, Alvin B.	Rochester
†	Heck, Frank J.	Rochester
¶	Heidel, Werner	Rochester
†	Heinberg, Charles E.	Rochester
£	Heine, Karl G.	Rochester
£	Heiser, Don R.	Rochester
†	Helgason, Pall B.	Rochester
‡	Helmholz, Henry F., Jr.	Rochester
‡	Henderson, Edward D.	Rochester
‡	Henderson, John W.	Rochester
‡	Henderson, Lowell L.	Rochester
#	Hendricks, John L.	China Lake, CA
‡	Hepper, Norman G.	Rochester
‡	Hermans, Paul E.	Rochester
‡	Herrell, Wallace E.	Rochester
†	Hewitt, Edith S.	Rochester
‡	Hill, John R.	Rochester
‡	Hill, Richard W.	Rochester
‡	Hines, Edgar A., Jr.	Brevard, NC
‡	Hoagland, H. Clark	Rochester
¶	Hodgin, Carol L.	Rochester
£	Hodgson, Corrin J.	Rochester
‡	Hodgson, John R.	Rochester
£	Hodgson, Stephen F.	Rochester
‡	Hoffman, David L.	Rochester
£	Hogan, William M.	Rochester
£	Holbrook, Margaret A.	Rochester
£	Holcomb, John F.	Rochester
‡	Holland, C. R.	Rochester
‡	Hollenhorst, Robert W.	Rochester
‡	Holman, Colin B.	Rochester
£	Horswill, Robert N.	Rochester
†‡	Horton, Bayard T.	Rochester
‡	Houser, Otis W.	Rochester
‡	Howard, Frank M., Jr.	Rochester
‡	Howell, Llewelyn P.	Rochester
£	Hu, Chung-Hong	Rochester
£	Huerta, Enrique	Rochester
†	Hunt, Arthur B.	Carnel, CA
‡	Hunt, James C.	Rochester
¶	Hunt, Max L., Jr.	Rochester
£	Hurley, Timothy J.	Rochester
#	Huston, Kent A.	Wichita, KS
#	Hynes, Kieran M.	Wright-Patterson AFB, OH
£	Ireland, Damian C. R.	Rochester
£	Irons, G. Benton	Rochester
£	Isaacson, Ronald	Rochester
£	Ivance, Richard J.	Rochester
‡	Ivins, John C.	Rochester
£	Jackman, Raymond J.	Rochester
£	Jackman, Steven J.	Rochester
£	Jackson, Charles B.	Rochester
£	Jander, Hartwig P.	Rochester
‡	Janes, Joseph M.	Rochester
£	Jibilian, Artin Y.	Rochester
‡	Johnson, Carl E.	Rochester
‡	Johnson, Einer W., Jr.	Rochester
£	Johnson, Luis F.	Rochester
£	Johnson, Marvin W.	Rochester
£	Johnson, Thomas F.	Rochester
£	Johnson, Warren L., Jr.	Rochester
‡	Johnson, William J.	Rochester
£	Jones, Ian V.	Rochester
‡	Jorgensen, Edward O.	Rochester
‡	Joseph, Ronald B.	Rochester

Continued on next page

COUNTY MEDICAL SOCIETY ROSTER

Zumbro Valley Medical Society (Continued)

‡	Joyce, John W.	Rochester	‡	Lofgren, Eric P.	Rochester
‡	Judd, Edward S.	Rochester	‡	Lofgren, Karl A.	Rochester
‡	Kaese, Werner E.	Rochester	‡	Logan, George B.	Rochester
#	Kaine, Richard F.	St. Albans, NY	‡	Logan, William S.	Rochester
#	Kantack, Paul W.	Rochester	#	Long, John C.	Hadley, MA
£	Kaplan, Roy A.	Rochester	‡‡	Love, J. Grafton	Rochester
£	Karlowksi, Thomas R.	Rochester	‡	Lucas, Alexander R.	Rochester
£	Karlstad, Gary L.	Rochester	£	Lucas, Charles T.	Rochester
‡	Karnes, William E.	Rochester	‡	Ludes, Bernard F.	Rochester
‡	Karrow, John W.	Rochester	£	Lund, Richard E.	Rochester
‡	Kazmier, Francis J.	Rochester	£	Luthra, Havinder S.	Rochester
‡	Kearns, Thomas P.	Rochester	‡	Lynn, Hugh B.	Rochester
‡‡	Keith, Haddow M.	Rochester	‡	McBean, James B.	Rochester
‡	Keith, Norman M.	Rochester	‡	McConahey, William M., Jr.	Rochester
‡	Kelalis, Panayotis P.	Rochester	£	McConahey, William M., III	Rochester
‡	Kelly, Patrick J.	Rochester	£	McCormick, Lawrence R.	Rochester
£	Kelman, Donald B.	Rochester	‡	McCoy, Stephen H.	Rochester
‡	Kennedy, Charles C.	Rochester	£	McDougall, John C.	Rochester
£	Kennel, Arthur J.	Kinshasa, Congo	£	McDuffie, Richard W., Jr.	Fort Hill, OK
£	Kepfer, Percy D.	Rochester	£	McElfresh, Edward C.	Rochester
‡‡	Kernohan, James W.	Rochester	#	McGee, Hugh E., Jr.	Fort Lee, VA
‡	Kerr, Frederick W. L.	Rochester	‡	McGill, Douglas B.	Rochester
£	Key, Samuel N., III	San Francisco, CA	£	McGuffin, Thomas V., III	Rochester
‡	Kiely, Joseph M.	Rochester	‡	McIlrath, Donald C.	Rochester
‡	Kierland, Robert R.	Rochester	‡	McKenna, Charles H.	Rochester
‡	Kimmel, George E.	Rochester	£	McMullan, Mart	Rochester
‡	Kincaid, Owings W.	Rochester	¶	McShane, Sister M. Quentin	Rochester
£	Kipfer, Robert E.	Rochester	‡	MacCarty, Collin S.	Rochester
‡	Kirby, Thomas J.	Rochester	£	MacCarty, Robert L.	Rochester
‡	Kirklin, John W.	Birmingham, AL	£	MacCarty, William C., III	Rochester
£	Kishel, Gene	Rochester	£	MacDade, Albert D. W.	Rochester
£	Klass, Donald W.	Rochester	#	MacDonald, Charles J.	Portsmouth, VA
£	Klein, Robert	Rochester	‡	MacLean, Alexander R.	Rochester
‡	Knutson, Lewis A.	Spring Grove	‡‡	Magath, Thomas B.	Rochester
‡	Konicek, Robert G.	Rochester	‡	Magid, Gail A.	Santa Cruz, CA
£	Koppers, Lawrence E.	Rochester	‡	Maher, Frank T.	Rochester
¶	Kortz, Louise S.	Rochester	£	Maish, George O., Jr.	Rochester
£	Koretzky, Emil D.	Rochester	£	Malagelada, Juan R.	Rochester
¶	Kostick, Joseph	Rochester	‡	Malek, Reza S.	Rochester
£	Krohn, John R.	Rochester	‡	Malkasian, George D.	Rochester
‡	Krueger, Bruce R.	Rochester	£	Maloney, James D.	Rochester
‡	Krupp, Neal E.	Rochester	£	Manesis, John G.	Rochester
#	Kuge, Mark T.	San Francisco, CA	‡	Mankin, Harold T.	Rochester
	Kvamme, Brynjulv	Mabel	‡	Marciniak, Thomas A. (Intern)	Rochester
‡	Kyle, Robert A.	Rochester	‡	Marcoux, J. Paul	Rochester
‡	Lake, Clifford F.	Rochester	‡	Marcus, Walter M.	Rochester
£	Landmark, James P.	Rochester	£	Marik, Francis	Rochester
£	Landmark, Sandra J. S.	Rochester	#	Marion, Dennis F.	Wright-Patterson AFB, OH
£	Lanier, Anne P.	Rochester	£	Marmer, Robert H.	Rochester
£	Lanier, James F.	Rochester	£	Marsiglia, Juan C.	Rochester
£	Lang, Clifford F.	Rochester	‡	Martens, Theodore G.	Rochester
£	Laventman, Jaime	Rochester	£	Martimbeau, Pierre	Rochester
‡	Laws, Edward R., Jr.	Rochester	‡	Martin, Gordon M.	Rochester
£	Lazar, Anthony S.	Rochester	‡	Martin, Harold R.	Rochester
‡	Leary, Frank J.	Rochester	¶	Martin, James E.	Rochester
#	Leavelle, Dennis E.	Darten, IL	‡	Martin, Maurice J.	Rochester
‡	Lee, Raymond A.	Rochester	£	Martin, Raymond A.	Rochester
‡	Lee, Robert E.	Rochester	£	Maruchi, Nobuhiro	Rochester
£	Leist, Frederick D.	Rochester	£	Maruta, Toshihiko	Rochester
£	Leonard, Paul F.	Rochester	‡	Mason, Bruce D.	Rochester
#	Levy, Jonathan M.	Albuquerque, NM	‡	Masson, Duncan M.	Rochester
‡	Lillie, John C.	Rochester	‡	Masson, James C.	Rochester
¶	Lind, Judy E.	Rochester	‡	Masson, James K.	Rochester
‡	Lindsay, Malcolm I., Jr.	Rochester	‡‡	Mathieson, Don R.	Rochester
#	Lippman, Harry H.	Rochester	£	Matlak, Michael E.	Rochester
‡	Litin, Edward M.	Hopkins	‡	Matson, Roland W.	Spring Valley
£	Little, John R.	Rochester	‡	Mayne, John C.	Rochester
‡	Litzow, Thaddeus J.	Rochester	£	Mendelson, Bryan C.	Rochester
£	Lockwood, Reed R.	Rochester	‡	Merritt, Wallace A.	Rochester
			‡	Messick, Joseph M.	Rochester
			£	Metter, Earl J.	Rochester

COUNTY MEDICAL SOCIETY ROSTER

Zumbro Valley Medical Society (Continued)

£ Meyer, James J. Rochester
 # Midyett, F. Allan Memphis, TN
 † Miller, John H. Rochester
 ‡ Miller, R. Drew Rochester
 ‡ Miller, Ross H. Rochester
 ‡ Miller, W. Eugene Rochester
 ‡ Millikan, Clark H. Rochester
 ‡ Mills, Stephen D. Rochester
 # Mitchell, John C., III Travis, AFB, CA
 † Moersch, Fred P. Ft. Lauderdale, FL
 †‡ Moersch, Herman J. Rochester
 £ Mokri, Bahram Rochester
 ‡ Molnar, George D. Rochester
 £ Monkman, George R. Rochester
 † Montgomery, Hamilton Rochester
 £ Moore, Burton A. Rochester
 ‡ Moore, Gordon L., II Rochester
 Mori, Hideo Grand Meadow
 # Morimoto, Allen M. APO Can Francisco, CA
 ‡ Morlock, Carl G. Rochester
 ‡ Morrow, George W., Jr. Rochester
 £ Morrey, Bernard F. Rochester
 ‡ Morse, Robert M. Rochester
 £ Motto, Joseph D. Rochester
 # Mroz, Christine T. Rochester
 £ Muhm, John R. Rochester
 £ Mulcahy, John J. Ann Arbor, MI
 ‡ Mulder, Donald W. Rochester
 ‡ Muller, Sigfrid A. Rochester
 £ Murphy, Joseph W. Rochester
 ‡ Myers, Thomas T. Rochester
 Mussey, Mary Elizabeth Rochester
 Nakajima, Shigenori Rochester
 # Nathan, Fred F. Ellsworth AFB, SD
 £ Nauman, James C. Rochester
 ‡ Neault, Roger W. Rochester
 £ Neel, H. Bryan, III Rochester
 £ Neinas, Frederick Rochester
 Nelsen Laurence T. Rochester
 £ Nelson, Roger L. Rochester
 Nelsen, Audrey M. Rochester
 £ Neupert, Jerrol R. Rochester
 ‡ Nessel, David G. Rochester
 Newcomber, Albert D. Rochester
 ‡ Nichols, Donald R. Rochester
 £ Nichols, Victoria R. Rochester
 £ Niedringhaus, Robert D. Rochester
 £ Nijensohn, Daniel E. Rochester
 £ Nisbet, William Rochester
 £ Niven, Robert G. Rochester
 ‡ Nobrega, Fred T. Rochester
 £ Nolan, Declan R. Rochester
 £ Noller, Kenneth L. Rochester
 £ Nyman, Kenneth E. Rochester
 ‡ Obetz, Samuel W. Rochester
 £ Odyniec, Norman A. Rochester
 O'Brien, Charles P. Rochester
 O'Connor, Michael K. Rochester
 £ O'Hara, James P. Rochester
 Olivencia, Jose A. Rochester
 Olivet, Ronald T. Rochester
 ‡ Olsen, Arthur M. Rochester
 Olson, Grant E. West Concord
 £ Olson, John D. Rochester
 ‡ Olson, Neal R. Rochester
 ‡ Onofrio, Burton M. Rochester
 † Onsgard, L. Kenneth St. Petersburg, FL
 £ Opel, D. Douglas Rochester
 £ Oppgrande, John D. Rochester

‡ Opitz, Joachim L. Rochester
 £ Orford, Robert R. Rochester
 ‡ Osmundson, Philip J. Rochester
 £ Otcro, Angel L. Rochester
 ‡ Owen, Charles A., Jr. Rochester
 # Oxman, Herbert A. San Antonio, TX
 £ Pairolero, Peter C. Rochester
 ‡ Palumbo, Pasquale J. Rochester
 £ Panum, Paul D. Rochester
 £ Paradis, Gaston R. Rochester
 Park, Joan M. Rochester
 ‡ Parker, Robert L. Rochester
 † Parkhill, Edith M. Rochester
 ‡ Parry, Rodney R. Rochester
 £ Passmore, James A. Rochester
 ¶ Patterson, Linda G. Rochester
 £ Patrick, Donald L. Rochester
 £ Paulson, Olaf B. Rochester
 ‡ Payne, W. Spencer Rochester
 † Pease, Gertrude L. Rochester
 £ Perrault, Jean F. Rochester
 ‡ Perry, Harold O. Rochester
 £ Perry, Michael C. Rochester
 ‡ Perry, Lawrence B. Rochester
 ‡ Peters, Gustavus A. Rochester
 £ Peterson, Eugene G. Rochester
 † Petersen, Magnus C. Rochester
 ‡ Peterson, Hamlet A. Rochester
 £ Peterson, Lawrence P. Rochester
 ‡ Peterson, Lowell F. A. Rochester
 ‡ Petit, Robert M. Rochester
 £ Petty, Roy W. Rochester
 ‡ Peyla, Thomas L. Rochester
 £ Pien, Francis D. Rochester
 ‡ Pierre, Robert V. Rochester
 £ Pliam, Michael Rochester
 ‡ Pluth, James R. Rochester
 £ Plutnicki, Ronald S. Rochester
 £ Poisson, Jacques Rochester
 ‡ Polley, Howard F. Rochester
 †‡ Pool, T. Lloyd Rochester
 £ Port, Friedrich K. Rochester
 ‡ Poston, Lawrence M. Caledonia
 Pougiales, Mary L. Rochester
 £ Powell, David F. Rochester
 ‡ Pratt, Joseph H., Jr. Rochester
 £ Prentice, Linda G. Rochester
 ‡ Prentice, James A. Rochester
 †‡ Priestley, James T. Rochester
 † Pruitt, Raymond D. Rochester
 ‡ Pugh, David G. Sanibel Island, FL
 ‡ Purnell, Don C. Rochester
 £ Quiroz, Salvador E. Rochester
 £ Radtke, Wallace E. Rochester
 £ Rahimi, Abbas Rochester
 £ Raimundo, Hugh Sa Rochester
 ‡ Ralston, Donald E. Rochester
 ‡ Randall, Raymond V. Rochester
 £ Ravry, Mario J. R. Rochester
 # Reckles, Lawrence N. Winter Park, FL
 ‡ Reese, David F. Rochester
 £ Reick, Robert R. Rochester
 ‡ Reitemeier, Richard J. Rochester
 ‡ ReMine, William H., Jr. Rochester
 ‡ Restall, Charles J. Rochester
 # Reynolds, James C. Madison, WI
 ‡ Riggs, B. Lawrence Rochester
 Rife, Charles C. Rochester
 Riley, Fenwick C., Jr. Rochester

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COUNTY MEDICAL SOCIETY ROSTER

Zumbro Valley Medical Society (Continued)

	Risser, Alden F.	Stewartville	‡	Simons, John N.	Rochester
‡	Ritter, Donald G.	Rochester	£	Simon, Norman M.	Rochester
‡	Rivan, Robert J.	Rochester	£	Siqueira, Aristarco	Rochester
£	Rivers, Thomas A.	Rochester	#	Skaggs, Harold, Jr.	Travis AFB, CA
‡	Robertson, Dennis M.	Rochester	†	Skolnick, Matthew D.	Rochester
£	Robertson, Robert C.	Rochester	£	Smigiel, Mitchell R., Jr.	Rochester
£	Robinson, Gerald	Rochester	£	Smith, J. Baldwin III	Rochester
£	Rodarte, Joe R.	Rochester	¶	Smith, Kay P.	Rochester
£	Rogers, John R.	Rochester	‡	Smith, Lucian A.	Rochester
£	Rogers, Roy S., III	Rochester	‡	Smith, Ralph E.	Rochester
†	Rogne, W. G.	Spring Grove		Smith, V. Roy	Rochester
‡	Rome, Howard P.	Rochester		Snyder, Robert E.	Spring Valley
‡	Rooke, E. Douglas	Rochester	£	Solley, Graham O.	Rochester
	Rosenbaum, Alan H.	Rochester	£	Somerville, Gordon W.	Rochester
‡	Rosenow, Edward C., III	Rochester	£	Sonnemaker, Robert E.	Rochester
	Rosevear, John W.	Minneapolis	‡	Soule, Edward H.	Rochester
‡	Ross, James V., Jr.	Rochester	£	Speirs, Harvey R.	Rochester
‡	Rovestad, Randolph A.	Rochester	‡	Spencer, Robert J.	Rochester
	Roy, Paul H. J.	Quebec, Canada	‡	Spiekerman, Ralph E.	Rochester
†‡	Rucker, Charles W.	Rochester	‡	Spittell, John A., Jr.	Rochester
£	Rue, David S.	Rochester	‡	Sprague, Randall G.	Rochester
‡	Rushton, Joseph G.	Rochester	£	Sridaromont, Somkid	Rochester
£	Russ, Homer H.	Rochester	£	Stanley, Ronald J.	Rochester
£	Ruzick, Russell S.	Rochester	£	Staryk, Steven E., Jr.	Rochester
†‡	Rynearson, Edward H.	Rochester	†‡	Stauffer, Maurice H.	Rochester
‡	Salassa, Robert M.	Rochester	#	Stecker, Raymond H.	APO, NY
£	Samara, David J.	Rochester	£	Stehr, Christian H.	Rochester
‡	Sander, Frank V., Jr.	Rochester	£	Stein, Paul S.	Rochester
£	Sanders, Herbert F.	Rochester	£	Steiner, Terrence R.	Rochester
‡	Sanderson, David R.	Rochester	‡	Steinhilber, Richard M.	Rochester
‡	Sandok, Burton A.	Rochester		Stephens, David H.	Rochester
£	Sanfelippo, Peter M.	Rochester	#	Stern, Berry L.	APO San Francisco, CA
£	Satava, Richard M.	Rochester		Stevens, William W. III	Rochester
	Sauer, Robert L.	Preston	£	Stewart, John W.	Rochester
‡	Sauer, William G.	Rochester	‡	Stickler, Gunnar B.	Rochester
£	Savoy, Leonard B.	Rochester	‡	Stickney, J. Minott	Rochester
‡	Sawtell, Robert R.	Rochester	‡	Stillwell, G. Keith	Rochester
‡	Scanlon, Paul W.	Rochester	†‡	Stilwell, George G.	Rochester
£	Sciallis, Gabriel F.	Rochester	£	Stone, Stephen P.	Rochester
‡	Schirger, Alexander	Rochester	£‡	Stonnington, Henry H.	Rochester
£	Schoenberg, Bruce S.	Baltimore, MD	‡	Stroebel, Charles F., Jr.	Rochester
‡	Scholz, Donald A.	Rochester	‡	Strong, Cameron G.	Rochester
£	Schroeder, James G.	Rochester	‡	Stubbs, Samuel E.	Rochester
£	Schroeder, Stephen B.	Rochester		Su, Man-Mai	Nadine
‡	Schroeter, Arnold L.	Rochester	£	Su, W. P. Daniel	Rochester
	Schulze, Thomas W., Jr.	Austin, TX	£	Suh, Ku Won	Rochester
	Schutt, Allan J.	Rochester	‡	Summerskill, William H.	Rochester
	Schutt, Ann H.	Rochester	£	Sun, Nora C. J.	Rochester
£	Schwab, Peter M.	Rochester	‡	Sundt, Thoralf M., Jr.	Rochester
¶	Schwartau, Neal W.	Rochester	£	Sung, David T. W.	Rochester
¶	Schwerman, Earl A., Jr.	Rochester	*‡	Svien, Hendrik J.	Rochester
£	Sciallis, Gabriel F.	Rochester	£	Swanson, Gene E.	Rochester
¶	Scott, James J.	Rochester	‡	Swanson, David W.	Rochester
#	Sebrechts, Paul H.	San Diego, CA	£	Takahashi, Raymond M.	Rochester
£	Seghers, Victor K.	Rochester	£	Tajik, Abdul J.	Rochester
‡	Seldon, T. Harry	Rochester	#	Tangedahl, Tim N.	Bismarck, ND
#£	Serafano, Donald N.	AFB, AZ	£	Tapia, Hugo R.	Rochester
‡	Sessler, Alan D.	Rochester	£	Tarm, Felix	Rochester
£	Seward, James B.	Rochester	‡	Taswell, Howard F.	Rochester
£	Shallal, John A.	Rochester	£	Thaell, John F.	Rochester
£	Shea, John A.	Rochester		Thomas, Juergen E.	Rochester
£	Shearin, Robert P. N.	Rochester		Thompkins, Richard B.	Rochester
†	Sheehan, Joseph C. M.	Rochester	¶	Thompson, Conrad O.	Rochester
£	Sheehan, William C.	Rochester	†	Thompson, Gershom J.	Rochester
£	Shen, Fu-hsiung	Rochester	£	Thompson, Robert R.	Rochester
‡	Sheps, Sheldon G.	Rochester	£	Thorsteinson, Guoni	Rochester
‡	Shick, Richard M.	Rochester	£	Throckmorton, Tom D.	Rochester
£	Sidell, Peter M.	Rochester	‡	Thurber, Deloran L.	Rochester
‡	Siekert, Robert G.	Rochester	£	Tiede, James J.	Rochester
‡	Silverstein, Murray N.	Rochester	†‡	Tillisch, Jan H.	Rochester

COUNTY MEDICAL SOCIETY ROSTER

Zumbro Valley Medical Society (Continued)

£	Timmons, John W., Jr.	Rochester
£	Tindel, Jerry R.	Rochester
‡	Tinkham, Robert G.	Rochester
£	Tinstman, Thomas C.	Rochester
‡	Tompkins, Richard B.	Rochester
£	Totz, Robert S.	Rochester
£	Townsend, Frederick A.	Rochester
#	Townsend, Gary L.	Abilene, TX
£	Trautmann, James C.	Rochester
£	Tressler, Hubert A.	Rochester
£	Triplett, Joseph N., Jr.	Rochester
#	Tsairis, Peter	Bethesda, MD
£	Tschetter, Loren K.	Rochester
‡	Tyce, Francis A.	Rochester
†	Uihlein, Alfred	Rochester
‡	Underdahl, Laurentius	Rochester
£	Utz, David C.	Rochester
£	Vanesak, Richard J.	Rochester
#	Van Dervoort, Robert L., Jr.	Columbia, MO
¶	Van Groll, Sister Kathleen	Rochester
	Van Herik, Martin	Rochester
#	Van Ness, W. Noel T.	Columbia, SC
†	Van Ooyen, Marinus	Rochester
‡	Vaughn, Louis D.	Rochester
	Vergin, Marcia	Rochester
	Virnig, Hildegard J.	Caledonia
	Von Feldt, Francis J.	Rochester
	Wahner, Heinz W.	Rochester
¶	Wakim, Khalil G.	Terre Haute, IN
£	Waldman, David J.	Rochester
‡	Wallace, Robert B.	Rochester
£	Walser, Adolf H.	Rochester
†‡	Walters, Waltman	Rochester
‡	Ward, L. Emmerson	Rochester
†	Watkins, Charles H.	Sun City, AZ
#	Webel, Max L.	Silver Springs, MD
£	Weber, Edward R.	Rochester
#	Webster, Kirk H.	San Antonio, TX
‡	Weed, Lyle A.	Rochester
‡	Weeks, Richard E.	Rochester
£	Wegener, Lee T.	Rochester
†‡	Weir, James F.	Rochester
£	Welsh, George F.	Rochester

‡	Welch, John S.	Rochester
‡	Wellman, William E.	Rochester
	Wellner, Theodore O.	Rochester
£	Welsh, George F.	Rochester
‡	Wente, Harold A.	Rochester
	Westmoreland, Barbara	Rochester
	Westrup, John E.	Lanesboro
‡	Wharton, William P.	Rochester
‡	Whisnant, Jack P.	Rochester
‡	White, Roger D.	Rochester
‡	White, William L.	Rochester
£	Whitehouse, James S.	Rochester
£	Wilder, Thomas C., Jr.	Rochester
	Wilkowske, Conrad J.	Rochester
£	Williams, Sidney D., Jr.	Rochester
	Williams, Thomas H.	Rochester
#	Williams, W. Byron	Charleston, SC
£	Willis, Larry F.	Rochester
*†‡	Willius, Frederick A.	Rochester
‡	Wilson, David M.	Rochester
	Wilson, M. Robert, Jr.	Faribault
‡	Wilson, Robert B.	Rochester
	Wilson, Viktor O.	Minneapolis
£	Wilson, Walter R.	Rochester
‡	Wilsie, John C.	Rochester
†	Winch, Thomas R.	Modesto, CA
‡	Winkelmann, Richard K.	Rochester
¶	Woida, Sharon F.	Rochester
£	Wolf, Richard J.	Rochester
‡	Wollaeger, Eric E.	Rochester
£	Wong, Terry C. Y.	Rochester
‡	Wood, Lloyd T.	Rochester
‡	Woods, John E.	Rochester
£	Woodward, Anthony H.	Rochester
‡	Woolner, Lewis B.	Rochester
‡	Worthington, John W., Jr.	Rochester
£	Yon, Jerry Lee	Rochester
	Yoss, Robert E.	Rochester
†‡	Young, Henry H.	Rochester
£	Youngberg, Stephen P.	Rochester
£	Zajarias, Alejandro	Rochester
£	Zuika, Maris	Rochester
£	Zujko, Richard D.	Rochester

ALPHABETIC ROSTER

Key to Symbols

*	Deceased	§	Medical Student
†	Associate and Life	#	Service
£	Resident and Intern	¶	Affiliate and Honorary
‡	Wife is Member of Women's Auxiliary		

A

	Aaro, Leonard A.	Rochester		Anderson, Carl F.	Rochester
£	Abboud, Charles F.	Rochester		Anderson, Chester A.	Hector
£	Abboud, Nabil	Rochester		Anderson, Chester A.	Madison
	Abraham, Arden L.	Duluth		Anderson, Dale L.	St. Paul
	Abrams, Alexander, Jr.	St. Paul		Anderson, Darrel R.	Hopkins
	Abrams, Donald J.	Shakopee		Anderson, David M.	Minneapolis
	Abramson, Burton J.	Minneapolis		Anderson, David P., Jr.	Austin
	Abramson, Milton	Minneapolis		Anderson, David W.	St. Paul
	Abullarade, Jose A.	Minneapolis	†	Anderson, Ernest R.	Minneapolis
	Abuzzahab, Faruk S.	Minneapolis		Anderson, Frank J.	Minneapolis
	Adair, Albert F., Jr.	St. Paul		Anderson, Franklin C.	Owatonna
	Adams, Brandon L. W.	Minneapolis		Anderson, Harold J.	Austin
	Adams, Harold R.	St. Paul		Anderson, James J.	St. Paul
	Adams, Patrick J.	Burnsville		Anderson, James M.	Duluth
	Adams, Richard I.	Minneapolis		Anderson, Jo E.	LeSueur
£	Adams, Richard O.	Rochester		Anderson, John A.	Minneapolis
	Adcock, Leon L.	St. Paul		Anderson, John R.	Minneapolis
	Adcock, Madeline S.	St. Paul		Anderson, John W.	Blue Earth
	Adicoff, Arnold	Minneapolis	†	Anderson, Karl W.	Excelsior
	Adkins, C. Douglas	Minneapolis		Anderson, Margaret C.	St. Paul
	Adkins, James T.	Coon Rapids	†	Anderson, Mark J.	Sun City, AZ
£	Adolphson, John D.	Fairmont		Anderson, Markham J., Jr.	Rochester
	Adson, Martin A.	Rochester	#	Anderson, Michael D.	Rochester
	Affeldt, Daniel E.	Kasson		Anderson, Milton W.	Rochester
	Aga, John J.	Brainerd		Anderson, Oscar D.	Mankato
	Agee, Andrew R.	Golden Valley		Anderson, Quentin N.	Minneapolis
£	Aquilo, Juan J.	Rochester	£	Anderson, Richard D.	Rochester
	Agustsson, Hreidar	Minneapolis	†	Anderson, Richard E.	Willmar
	Ahern, Eugene E.	Minneapolis		Anderson, Richard W.	St. Paul
†	Ahlfs, Jacob J.	Ft. Lauderdale, FL		Anderson, Richard W.	Minneapolis
	Ahlstrom, Robert C.	Minnetonka		Anderson, Roger E.	Minneapolis
	Ahmann, David L.	Rochester		Anderson, Roger L.	Minneapolis
	Ahola, Kenneth E.	Hibbing		Anderson, Russell H.	Virginia
	Ahrens, Curtis F.	Duluth	†	Anderson, U. Schuyler	Ft. Snelling
	Ahrens, Robert M.	St. Paul		Anderson, W. Robert	Minneapolis
	Akbar, Sajady	Minneapolis		Anderson, Waldo P.	Buffalo
	Akhaven, Traz	Alexandria		Anderson, Wallace E.	Minneapolis
	Akins, Willard M.	Red Wing		Anderson, William H.	Minneapolis
	Aksoy, Mustafa	St. Paul		Anderson, William T.	Minneapolis
	Alari, Heino	Excelsior		Andre, James C.	Minneapolis
*	Albrecht, Raymond J.	St. Paul	†	Andreassen, Einar C.	Minneapolis
	Alden, Charles W.	Sauk Rapids		Andreassen, Rolf L.	Minneapolis
	Alden, John F.	St. Paul		Andreini, Paul H.	Rochester
	Alexander, Paul J.	Hibbing		Andresen, Karl d'A	Minneapolis
†	Aling, Charles A.	Minneapolis	£	Angelini, Corrado	Rochester
	Alkon, Ellen	Minneapolis		Ankner, Frank J.	Minneapolis
	Allen, George L.	Rochester		Anonsen, Richard E.	Minneapolis
	Allen, James R.	Minneapolis		Anselment, Lois A.	Excelsior
	Allen, John H.	Montevideo	£	Anthony, Richard R.	Rochester
	Allison, David D.	Litchfield		Ansori, Azam	Minneapolis
£	Allred, Howard W., Jr.	Rochester		Antolak, Stanley J., Jr.	St. Paul
	Alt, Thomas H.	Minneapolis		Antonelli, Jordan J.	Hibbing
	Alter, Milton	Minneapolis		Antonow, Arthur M.	Virginia
	Altman, Robert L.	St. Paul	#	Appelstein, Bruce	Chicopee, MA
	Alton, Donald G.	St. Paul		Arensen, Paul M.	Mankato
£	Alvarez, Marcus N.	Rochester		Arenson, Jeffrey A.	Minneapolis
	Amatuzio, Donald S.	Minneapolis		Arey, Stuart Lane	Minneapolis
	Amerongen, Werner W.	St. Paul		Arhelger, Stuart W.	Minneapolis
	Amra, Waleed	Chaska		Arko, Frank R.	Hibbing
	Amren, Don P.	Minneapolis		Arlander, Clarence E.	Minneapolis
	Anderegg, Alfred F.	Minneapolis		Arlander, Thomas R.	Minneapolis
	Andersen, Horace J.	Winona		Arling, Leonard S.	Minneapolis
	Andersen, Howard A.	Rochester		Armin, David W.	Two Harbors
	Andersen, James G.	Minneapolis		Arms, James J.	Minneapolis
	Andersen, Robert C.	Minneapolis		Armstrong, Byron H.	Minneapolis
	Anderson, Arden O.	Brainerd		Armstrong, Ralph S.	Winnebago
	Anderson, Arnold S.	Minneapolis			

CHANDLER-CRAIG

Chandler, William M.	Minneapolis	£	Cohen, Manley	Long Beach, CA
† Chatterton, Carl C.	St. Paul		Cohen, Sumner S.	Minneapolis
Chawla, Ramesh C.	St. Cloud		Coifman, Robert E.	Minneapolis
Chedister, Charles R.	Minneapolis		Colago, Victor M.	Browns Valley
Chermak, Francis G.	Phoenix, AZ		Colby, Malcolm Y., Jr.	Rochester
Chervenak, William A.	St. Paul		† Colby, Woodard L.	St. Paul
£ Chesebro, James H.	Rochester		Cole, George A.	Albert Lea
Chesler, Merrill D.	Minneapolis		Cole, James S.	Minneapolis
£ Chiavetta, Stephen V., Jr.	Rochester		Cole, Wallace H.	St. Paul
£ Chidlow, Judd H.	Rochester		Coleman, John B.	St. Paul
Child, Sherman B.	Minneapolis		# Coleman, Robert L.	Whiteman AFB, MO
Childs, Donald S., Jr.	Rochester		Colman, Thomas P.	Minneapolis
£ Chilgren, Keith V.	St. Paul		Coll, James J.	Duluth
Chisholm, Tague C.	Minneapolis		£ Collins, Eugene	Rochester
Chizek, David	St. Paul		Collins, Roger T.	Duluth
Choithani, C. M.	Crookston		Collenge, James H.	Detroit Lakes
Choithani, H. C.	Crookston		Colliton, Patrick A.	Moorhead
Chou, Shelley N.	Minneapolis		Colman, Edward L.	Fergus Falls
Christensen, Clarence H.	Duluth		Colosey, Fredericks	Virginia
† Christensen, Eli E.	Winona		Colton, Roger S.	St. Paul
Christensen, Llewellyn E.	Minneapolis		£ Colville, David	Rochester
Christensen, Norman A.	Rochester		Comfort, Thomas H.	St. Paul
£ Christensen, Robert D.	Rochester		£ Conley, Dean R.	Rochester
£ Christenson, Carl E.	Brighton		Conley, Robert H.	Mankato
Christenson, Leland R.	Minneapolis		Conlin, F. Dixon	Bismarck, N.D.
Christgau, Roger A.	Minneapolis		Conlon, Daniel C.	Minneapolis
Christian, William L.	Minneapolis		Conn, Doyt L.	Rochester
Christiana, Richard L.	Rochester		£ Conn, Richard L.	Rochester
# Chumbley, Lee C.	Patuxent River, MD		Connolly, Coleman J.	St. Paul
Chunn, Stanley S.	Willmar		Connolly, Joseph P.	So. St. Paul
Church, Gerald E.	Two Harbors		† Connor, Charles E.	St. Paul
Churchill, Jane	Park Rapids		£ Connor, David G.	San Francisco, CA
£ Chychota, Norman N.	Rochester		*† Cook, Edward N.	Rochester
Cich, John A.	Minneapolis		£ Cooke, Nelson R.	Rochester
Ciriacy, Edward W.	Minneapolis		Coombs, Carl H.	Cass Lake
£ Citron, Joseph	Minneapolis		£ Cooney, William P.	Rochester
Clapp, Hubert D.	Crookston		Cooper, Charles C.	Moose Lake
† Clark, Edward C.	San Francisco, CA		£ Cooper, George IV	Rochester
Clark, Elizabeth A. (Mrs. Halbert)	Duluth		Cooper, Jack M.	St. Paul
† Clark, Harry B.	St. Cloud		Cooper, John P.	Minneapolis
Clark, Ivan T.	Sun City, AZ		Cooper, Robert R.	Minneapolis
† Clark, Leslie W.	Manchester, IA		Cooper, Talbert	Rochester
Clark, Malcolm D.	Minneapolis		# Cooperman, Avram M.	Wichita Falls, TX
Clark, Robert S.	Minneapolis		Cope, Hershel B.	Virginia
Clark, W. Bruce	St. Paul		† Corbin, Kendall B.	Rochester
Clarke, Dean T.	Faribault		† Corniea, Albert D.	Minneapolis
Clarke, John W.	Waconia		£ Corrado, Angelini	Rochester
Clay, Lyman B.	Minneapolis		Correa, Dale H.	Minneapolis
Cleary, John	St. Paul		Corrigan, Cyril J.	Rochester
£ Clement, Denis L.	Rochester		Corson, Wilfred A.	Minneapolis
Clifford, George W.	Alexandria		£ Cortese, Denis A.	Rochester
Clifford, Thomas M.	Silver Bay		Cortez, Daniel P.	Minneapolis
† Clifton, Theodore A.	Hollywood, FL		Cosgriff, James A., Jr.	Olivia
Cline, David W.	Minneapolis		Cotton, Gerald E.	Duluth
£ Clotherty, Martin G.	Grand Rapids		Coulter, Harold E.	Minneapolis
Close, Gerald A.	Glencoe		*† Countryman, Roger S.	Vancouver, B.C., Canada
Closuit, Frederick	Aitkin		# Courteau, Robert D.	Ginelo, Rhodesia
Cochrane, Byron B.	St. Paul		Coventry, Markham B.	Rochester
Cochrane, Ray F.	Minneapolis		Coventry, William D.	Duluth
Coddon, Walter D.	St. Paul		Covey, Kenneth W.	Moorhead
Cody, D. Thane	Rochester		Cowan, Donald W.	Minneapolis
£ Cody, Michael C.	Rochester		Cowan, Gary A.	Duluth
Coe, John I.	Minneapolis		Cowan, George M.	Duluth
Coe, Robert O.	Virginia		Cowger, Robert C.	Farmington
£ Cofield, Robert H.	Rochester		Cox, Milton J.	Duluth
Cohan, Richard C.	Minneapolis		Cox, Russell L.	Spirit Lake, Iowa
Cohen, Bernard A.	Minneapolis		Coy, Douglas J.	Grand Rapids
Cohen, Ephraim B.	Minneapolis		Coyne, Terrence	Minneapolis
Cohen, Henry W.	Wayzata		Craig, David M.	St. Paul

Craig, M. Elizabeth	Minneapolis	Crutchfield, Charles E.	St. Paul
Cram, Barclay M.	St. Paul	Crutchfield, Susan E.	St. Paul
Cramer, Glen G.	New Brighton	Cruz, Waldemar F.	Minneapolis
† Cranmer, Richard R.	Laguna Hills, CA	Cuderman, Bert S.	Duluth
Cranston, Robert W.	Minneapolis	Cullado, Andronic F.	Minneapolis
Creevy, Charles D.	Minneapolis	# Cullen, Robert M.	Elmore
Creps, James R.	Duluth	Culligan, David E.	St. Paul
Cress, Thomas L.	St. Cloud	Culligan, John A.	St. Paul
Crislip, George D.	Waconia	Culligan, Leo C.	Minneapolis
Croissant, Raymond C.	Minneapolis	Culp, Clyde E.	Rochester
† Cronwell, Bernhard J.	Austin	Culp, Ormond S.	Rochester
£ Crossley, Kent B.	Newtonville, MA	Culver, Lucian G.	St. Paul
£ Crout, James E.	Rochester	Cumming, Edward D.	St. Paul
Crow, Earl R.	Minnetonka	Cumming, Robert J.	St. Cloud
Crow, George M.	International Falls	Cundy, Donald T.	Minneapolis
£ Crowder, David F.	Rochester	Cupps, Roger E.	Rochester
Crowley, James H.	St. Paul	Curran, John P.	Minneapolis
Crowley, Leonard V.	Minneapolis	Cushing, Richard T.	Minneapolis
Crudo, Vincent D.	St. Paul	† Cutts, George	Minneapolis
Crum, Arthur Z.	St. Paul		

D

Daehlin, Rolf	Fergus Falls	Dearing, William H.	Rochester
Dagg, Earl	Thief River Falls	Deason, Keith B.	Chisago City
Daggett, Donald R.	Minneapolis	Deaton, Burrell H.	Minneapolis
Dahl, James C.	Minneapolis	† DeBus, Robert L.	Rochester
† Dahl, John A.	Excelsior	Decker, Charles W.	Hibbing
Dahlin, David C.	Rochester	Decker, David G.	Rochester
Dahlquist, LaRue	St. Cloud	£ DeCourcy, Donald M., Jr.	Rochester
Dahlstrom, Donald D.	Minneapolis	DeCupas, Luis A.	St. Paul
Dale, Allan J. D.	Rochester	† Dedeker, Kenneth L.	Minneapolis
Dale, Les N.	Hastings	£ Deering, Timothy B.	Rochester
£ Daley, Dennis E.	Rochester	Degallier, Daniel	Winona
Daly, Alfred E.	St. Paul	# Deger, Grant E.	Fairchild, AFB, WA
Damberg, Sheldon W.	St. Paul	DeHaan, Eddie D.	Minneapolis
£ Daniel, Britt	Rochester	Delahunty, John R.	Red Wing
† Daniel, Donald H.	Wayzata	deLeon, Buenaventura	Stillwater
Daniel, Clarke G.	Minneapolis	Delmore, Jack	Roseau
Danielson, Lennox	Litchfield	Delzell, Allen W.	Minneapolis
Danoff, David	Minneapolis	De Marais, Lloyd C.	Hibbing
Danyluk, Michael	Minneapolis	£ DeMeester, Lee J.	Rochester
£ Dargaville, Richard M.	Rochester	Demo, Robert A.	Albert Lea
Dargay, Cyril P.	Minneapolis	Derauf, Donald E.	St. Paul
£ Daugherty, Guy W.	Rochester	£ Derbenwick, Kenneth P.	Rochester
Daumann, Roy F.	Minneapolis	£ Derbenwick, Mary June	Rochester
£ Dauphine, Richard T.	Rochester	Derechin, William	St. Paul
Davenport, Jay A.	Virginia	DeRemee, Richard A.	Rochester
David, Reuben	Hopkins	† de Souza e Silva, Nelson A.	Rochester
Davidson, A. Dale	Duluth	De Santo, Lawrence W.	Rochester
Davidson, J. Duane	Thief River Falls	Deters, Donald C.	St. Paul
£ Davidson, Michael J.	Rochester	Deutsch, Robert J.	Duluth
† Davis, Austin C.	Pompano Beach, FL	Devine, Kenneth D.	Rochester
Davis, Curtis E.	Minneapolis	Devloo, Robert A.	Rochester
£ Davis, David L.	Rochester	DeWeerd, James H.	Rochester
Davis, Edward V.	St. Paul	£ DeWeerd, James H., Jr.	Rochester
Davis, Eunice A.	St. Paul	DeWeese, Joel T.	Bemidji
Davis, George D.	Rochester	Deweese, Wilford J.	Bemidji
† Davis, Lloyd T.	Wadena	deWerd, Robert W.	Owatonna
Davis, Luther F.	Wadena	Dewey, Donald H.	Owatonna
Davis, Michael W.	Minneapolis	Dey, James W.	Waseca
Davis, Raymond D.	Stockton, CA	Diamond, Robert A.	Minneapolis
Davis, Thomas H.	Minneapolis	£ Diaz-Buxo, Jose A.	Rochester
Davis, William E.	St. Paul	Dickinson, Paul B.	St. Paul
Davis, William I.	Moose Lake	Dickman, Roy W.	Minneapolis
Dawson, Lorin D.	Worthington	Didier, Edward P.	Rochester
Dawson, W. John, Jr.	Minneapolis	Diefenbach, Eugene J.	Minneapolis
		Diego, Benito B.	Fridley

DIEHL-ELKEMA

†	Diehl, Harold S.	New York, NY
	Diehl, James J.	Minneapolis
	Dieperink, Willem	St. Paul
	Dierker, Heinrich A.	Minneapolis
	Diessner, Ardell W.	Stillwater
	Diessner, Grant R.	Rochester
*†	Diessner, Henry D.	Hopkins
	Dillie, Donald E.	Litchfield
	Dillenburg, Cyril J.	Crookston
	Dimants, Janis, Jr.	Minneapolis
*	Dimmick, Ivan C.	Brainerd
	Dines, David E.	Rochester
†	Dittrich, Raymond	St. Paul
£	Djalilian, Mohsen	Rochester
	Doan, Robert E.	Wayzata
†	Dobbins, Donald V.	Rochester
	Dobbs, Richard L.	Duluth
	Dobler, Manfred G.	Ely
†	Dobrin, Dale T.	Minneapolis
	Dobson, Mervin W.	Mankato
	Dobyns, James H.	Rochester
	Docherty, John A.	Edina
	Dockerty, Malcolm B.	Rochester
	Docksey, John W.	Willmar
	Dodds, William C.	Detroit Lakes
	Dodson, Albertus F.	Brainerd
	Doebler, Myron I.	Bagley
	Doherty, Elmer M.	New Prague
	Dokken, James H.	Windom
	Doman, Victor W.	Lakefield
§	Domino, Terry A.	St. Paul
	Doms, Vernon A.	Elbow Lake
†	Donaldson, Charles S.	St. Cloud
	Donatelle, Edward P.	Minneapolis
£	Donoghue, Edmund R., Jr.	Rochester
§	Donehower, Ross C.	St. Paul
	Donoghue, Francis E.	Rochester
	Donovan, Daniel L.	New Brighton
	Dooley, Robert T.	St. Paul
	Doren, Austen H.	Little Fork
†	Dorge, Richard I.	Minneapolis
	Dornbach, Robert A.	Minneapolis
	Dorsey, George C., Jr.	Minneapolis
	Dorsey, William E.	Minneapolis
	Doscherholmen, Alfred	Minneapolis
	Doty, Joseph	Little Falls
	Dougan, Jerome W.	Minneapolis
	Douglass, Bruce E.	Rochester
	Douglass, Jesse E.	Canon Falls
	do Vale, Joao M.	Minneapolis
	Dover, James W.	Mankato

£	Downey, Gale T.	Rochester
†	Doxey, Gilbert L.	Minneapolis
	Doyle, James R.	Rochester
£	Dozois, Roger R.	Rochester
	Drage, Charles W.	Minneapolis
†	Dredge, Thomas E.	Minneapolis
	Dredge, Thomas E., Jr.	Minneapolis
	Drexler, Charles J.	Duluth
	Drexler, George W.	Blue Earth
	Dreyling, Roger A.	Eden Valley
£	Drijanski, Ruben	Rochester
	Drill, Frederick E.	Minneapolis
	Drill, Herman E.	Hopkins
†	Drips, Della G.	Rochester
£	Driscoll, Thomas P.	Rochester
	Drucker, Franklin G.	Bigfork
	Duane, Drake D.	Rochester
£	Du Boff, Stuart M.	Rochester
£	Dubois, David D.	Rochester
	Dubois, Julian F.	Sauk Center
	Duerr, Eleanor E.	St. Paul
	Duffy, John L.	St. Paul
£	Dukes, Russell J.	Rochester
	Dummer, Donald J.	Minneapolis
£	Dumesnil, Jean G.	Rochester
	Duncan, Donald A.	Minneapolis
	Duncan, James W.	Moorhead
	Dunham, Charles K.	St. Paul
	Dunkel, Thomas B.	St. Louis Park
	Dunlap, David J.	Minneapolis
	Dunlap, Earl H.	Minneapolis
	Dunn, James P.	St. Paul
£	Dunn, John S.	Rochester
	Dunn, Robert C.	St. Paul
	Dunstan, Paul L.	Willmar
	Dupont, Joseph A.	Excelsior
	Durkin, John L.	St. Paul
	Duryea, Willis M.	Minneapolis
	Duryea, Willis M., Jr.	Minneapolis
	Duthoy, Everette J.	St. Paul
	Dutt, Ray	St. Paul
	Duvall, Arndt J., III	St. Paul
	Dvorak, Benjamin A.	Minneapolis
	Dwan, Paul F.	Minneapolis
†	Dworsky, Samuel D.	Minneapolis
	Dwyer, John J.	Duluth
	Dyck, Peter J.	Rochester
	Dyer, John Allen	Rochester
	Dyrdal, Paul J.	St. Paul
	Dysterheft, Adolf F.	Gaylord
	Dzuibinski, Emil H.	St. Cloud

E

	Earl, John R.	St. Paul
	Earl, Stephan H.	Minneapolis
	Eaton, David B.	Worthington
	Eberley, Tobe S.	Benson
	Ebert, Richard V.	Minneapolis
	Eckdale, John E.	Marshall
	Eckerly, Jean R.	Minneapolis
	Eckert, Joseph F.	Mankato
	Eckman, Matthew J.	Duluth
	Eckman, Philip F.	Duluth
	Eckman, Philip L.	Duluth
	Eckman, Ralph J.	Duluth

	Eder, Walter P.	Minneapolis
	Edin, Andrew	Winona
	Edmondson, Hugh A., Jr.	Minneapolis
	Edwards, Laura E.	St. Paul
†	Edwards, J. Willard	St. Paul
	Edwards, Jesse E.	St. Paul
	Edwards, Lloyd G.	St. Paul
†	Edwards, Richard B.	St. Paul
	Edwards, Thomas J.	St. Paul
†	Edwards, Walter G., Jr.	Bethesda, MD
	Edwardson, Phillip L.	St. Paul
	Elkema, Herman H.	St. Paul

Efteland, Myles E.Minneapolis
 £ Egan, Ernest L.Rochester
 Egge, Sanford G.Albert Lea
 Eggert, Delmer C.Mankato
 Eginton, Charles T.Fargo, ND
 Ehlen, Charles P.St. Cloud
 † Ehrlich, S. PaulMinneapolis
 Eich, Matthew A.Minneapolis
 Eichelberger, Dale L.Willmar
 Eichenlaub, John E.Minneapolis
 Eichhorn, Edmund P., Jr.Minneapolis
 £ Eichten, John G.Minneapolis
 Eide, O. A.Hancock
 † Eiden, Vera M.Afton
 Eifrig, David E.Minneapolis
 Eilers, Vincent E.St. Paul
 Einzig, Mitchell J.Wayzata
 z Eisenberg, M. MichaelMinneapolis
 Eisenkees, C. F.Mankato
 Eisenman, WalterHibbing
 Eisenstadt, William S.Minneapolis
 † Eitel, George D.Minneapolis
 Ekberg, FredDetroit Lakes
 Eklund, Carl D.Duluth
 † Elkins, Earl C.Rochester
 Ellertson, Leonard M.Albert Lea
 Ellinger, Albert J.Willmar
 £ Ellingsen, Norman H.Rochester
 Ellingson, Richard B.Minneapolis
 Ellington, Anna L.Minneapolis
 Elliott, Charles M.Rochester
 Elliott, J. W.Mankato
 Ellis, Cassius M. C.Minneapolis
 Ellis, Earl W.Elgin
 Ellis, John C., Jr.Minneapolis
 Ellis, Ronald W.St. Paul
 Ellison, Evan S.Minneapolis
 *† Ellison, Frank E.Monticello
 Ellwood, Paul M., Jr.Minneapolis
 Elumba, Teodoro V.St. Paul
 Emanuel, Karl W.Duluth
 † Emerson, Edward C.St. Paul
 Emerson, Edward C.St. Paul
 Emerson, Edwin E.Osakis
 Emerson, Robert K.Rochester
 † Emmett, John L.Rochester
 Emmons, Patricia R.Vancouver, B.C., CA
 Emmons, Robert W.St. Paul
 † Emond, Joseph S.Farmington
 Emond, Joseph S., Jr.Farmington
 Emslander, Richard F.Rochester

† Endress, Edward K.St. Paul
 Engebretson, PaulAlexandria
 Engel, Andrew G.Rochester
 Engel, Joseph P.Minneapolis
 Engel, William L.Minneapolis
 # Engelberg, JerryFairfield, CA
 † Engels, Edward P.Lexington, KY
 Engelsgjerd, Gerald L.Duluth
 Engelstad, Wendell P.Virginia
 England, Rodney W.St. Paul
 Englund, Elvin F.Minneapolis
 Engstrom, E. DuaneMinneapolis
 Engstrom, GeorgeSt. Peter
 Engstrom, Robert B.Mankato
 Engwall, Richard L.Minnetonka
 Enroth, Oscar E.St. Paul
 Erdal, Ove A.Albert Lea
 Erich, John B.Rochester
 † Erickson, Alvin O.Long Prairie
 Erickson, CarltonLindstrom
 Erickson, Donald J.Rochester
 Erickson, Donald L.St. Paul
 Erickson, Jeffery L.Minneapolis
 Erickson, Laurence F.Minneapolis
 Erickson, Myron E.Minneapolis
 Erickson, Robert L.Rosemount
 Erickson, Vernon D.Grand Rapids
 Ericson, John E.Minneapolis
 Ericsson, Kermit C.Cambridge
 Erlanson, A. CornellSt. Paul
 Erling, Carl B.St. Paul
 £ Ersek, Robert A.Minneapolis
 Ersfeld, Murray P.St. Paul
 Eselius, Erik P.Minneapolis
 Esensten, SidneyMinneapolis
 Espelien, Alan D.St. Cloud
 Espinosa, Raul E.Rochester
 Estrem, Ralph L.Fergus Falls
 Estrem, Robert D.Fergus Falls
 # Ettinger, David S.Ft. Leavenworth, KS
 £ Etzell, Paul S.Rochester
 Etzwiler, Donnell D.Minneapolis
 Eusebio, ErnestoMinneapolis
 Eustermann, John J.Mankato
 † Evans, Edward T.Minneapolis
 Evans, James M.Northfield
 Evans, Leslie M.Sauk Rapids
 Evensta, John B.Grand Rapids
 Everhart, Clarence E., Jr.Minneapolis
 Everly, Stephan S.Minneapolis
 Evison, Emerson O.Duluth
 Ewens, George B.Virginia

F

Faber, John E.Rochester
 Facer, George W.Rochester
 £ Falcone, James C.Rochester
 Fallon, Virgil T.Minneapolis
 Falls, John L.Red Wing
 Farber, Abigail F.Minneapolis
 Farber, Lawrence A.Minneapolis
 Farber, Roger E.Minneapolis
 Farley, Harrison H.Minneapolis
 Farr, John D.St. Paul
 £ Farrell, Kenneth H.Rochester
 Farrell, T. EdwinMinneapolis
 Fasbender, Herman T.Hastings

Fauchald, Nils, Jr.Red Wing
 Faul, Bennie C.Worthington
 £ Faulconer, Albert, Jr.Rochester
 Faust, John H.Northfield
 £ Fawcett, Arthur M.Renville
 † Fawcett, Keith R.Duluth
 # Fay, Thomas M.Oakland, CA
 Fedders, SkaidriteWillmar
 Fedor, RobertWillmar
 Fee, John G.St. Paul
 Fehr, Peter E.Minneapolis
 Feigal, David W.Wayzata
 Feigal, Gary R.Lake City

FEIGAL-FRYTAK

Feigal, William M.Fairmont
 Feinberg, PhilipMinneapolis
 Feinberg, Samuel B.Minneapolis
 £ Feist, Donald J.Rochester
 Felder, Davitt A.St. Paul
 Feldmann, Floyd M.Pompano Beach, FL
 Felion, Arthur J.St. Paul
 Fenske, Arnold W.Winona
 Ferguson, John N.St. Paul
 Ferguson, Richard H.Rochester
 Fernandez, Rafael F., Jr.Minneapolis
 Ferrell, Clarence R.Moose Lake
 £ Ferris, Deward O.Rochester
 Fesenmaier, Otto B.Los Angeles, CA
 † Fesler, Harold H.W. St. Paul
 Fetzek, Albert D.Minneapolis
 Feuling, John C.Sun City, AZ
 £ Fibuch, Eugene E.Rochester
 Field, Charles W.Hopkins
 Fifer, Ellen Z.St. Paul
 Fifer, William R.Minneapolis
 Fifield, Malcolm M.Duluth
 £ Filbuch, Eugene E.Rochester
 Filiatrault, L. J.Coon Rapids
 Filipovich, Orest N.Minneapolis
 Fingerman, David L.Minneapolis
 Fink, Daniel L.St. Paul
 # Fink, Lawrence H.Bethesda, MD
 † Fink, Leo W.Minneapolis
 £ Fink, Richard A.Rochester
 Fink, Robert J.Minneapolis
 Finkelnburg, William O.Winona
 Finkelstein, JoelMinneapolis
 Finlayson, Richard E.Duluth
 Finstad, James E.Minneapolis
 Fiore, Joseph P.Rochester
 £ Fischer, Albert P.Minneapolis
 Fischer, Robert F.St. Paul
 Fish, Charles R.Rochester
 Fisher, Don H.Minneapolis
 Fisher, Howard W.Minneapolis
 Fisher, Isadore I.Minneapolis
 Fisketti, HenryDuluth
 Fitch, Charles G.Worthington
 Fitzsimons, William E.Brainerd
 £ Fitzgerald, Robert H.Rochester
 £ Fitzgerald, Robert H., Jr.Rochester
 † Flancher, Leon H.Detroit Lakes
 # Flanigan, Donald J.Pensacola, FL
 Flannery, Hubert F.St. Paul
 Fleming, Dean S.Minneapolis
 Flemenbaun, AbrahamMinneapolis
 Fleming, Janice L.St. Paul
 # Flick, William F.Cheyenne, WY
 Fliehr, Richard R.Minneapolis
 Flinn, James B.Redwood Falls
 Floersch, Adrian J.Owatonna
 Flom, Reynold P.St. Paul
 Flom, Robert S.St. Paul
 Flora, George C.Minneapolis
 Florence, David W.St. Paul
 Florine, Martin C.Madison Lake
 Flory, William D.Minneapolis
 Fluegel, John O.Minneapolis
 Flynn, Bernard F.Hibbing
 Flynn, Louis L., Jr.St. Paul
 Foderick, John W.Hastings
 Foderick, Peter P.Ada

Fogelberg, Emil J.St. Paul
 Foker, Leslie W.Minneapolis
 Foley, Robert R.Minneapolis
 Foley, William A.Minneapolis
 £ Folger, Walter N.St. Paul
 Folsom, Louis B.Minneapolis
 Foni, Iancu F.Faribault
 Fontana, Robert S.Rochester
 Forbes, Edward F.Minneapolis
 £ Fordyce, Richard A.Rochester
 Foreman, Richard T.St. Paul
 £ Forgacs, PierreRochester
 Forsythe, James R.St. Paul
 Fortier, George M. A.Little Falls
 Fortier, George M. A., Jr.Little Falls
 Fortier, Rene G.Mankato
 Fortuny, Ignacio E.Minneapolis
 Foss, Donald L.Minneapolis
 † Foss, Edward L.Condon, MT
 Foster, Orley W.Minneapolis
 Foulk, William T., Jr.Rochester
 Fox, Donald P.St. Paul
 Fox, James RogersMinneapolis
 Fox, LeRoy J.St. Paul
 Fraley, Elwin E.Minneapolis
 † Franchere, Frederick W.Lake Crystal
 † Francis, David W.Morristown
 Franckowiak, J. L.Mankato
 Frane, Donald B.Minneapolis
 Frane, Gerald T.Minneapolis
 Franklin, Gordon W.Northome
 £ Fraser, Richard A.Rochester
 † Frederickson, Alice C.Willmar
 Frederickson, David L.Duluth
 Fredlund, Jon S.Anoka
 Freeman, Charles D., Jr.St. Paul
 Freeman, Craig W.Minneapolis
 Freeman, Donald H.Minneapolis
 Freeman, Donald W.St. Louis Park
 £ Freeman, Richard E.Rochester
 French, Bayard T.Hibbing
 French, Lyle A.Minneapolis
 Frericks, Roger L.Fergus Falls
 £ Freshman, John R.Rochester
 Frethem, Allen A.Rochester
 Frey, Richard J.Minneapolis
 Friberg, Joseph B.Minneapolis
 † Fricke, Robert E.Rochester
 Fried, Louis A.Minneapolis
 † Friedell, AaronMinneapolis
 Friedell, GeorgeMinneapolis
 Friedlieb, Oskar P.Virginia
 Friedman, Harry S.Minneapolis
 Friedrich, Bradford E.Red Wing
 Friend, Charles A.Minneapolis
 † Fritsche, AlbertNew Ulm
 Fritsche, Carl J.New Ulm
 Fritsche, Theodore R.New Ulm
 Fritz, Wallace L.St. Paul
 *† Froats, Charles W.St. Paul
 Fromke, Vincent L.Minneapolis
 Frost, John B.Minneapolis
 Frost, John W.St. Paul
 Fruchtmann, Stanley A.Minneapolis
 £ Fruen, Paul R.St. Paul
 Frye, Charles W.St. Paul
 Frys, Russell N.Minneapolis
 £ Frytak, StephenRochester

FUGLESTAD-GOLDSTEIN

#	Fuglestad, Edson V.	Minneapolis
	Fuglestad, J. Roald	Minnetonka
†	Fuller, Alice H.	Minneapolis
	Fuller, Benjamin F.	White Bear Lake
	Fuller, Josiah	Duluth
†	Funk, Victor K.	Hopkins

	Funke, Joyce L.	St. Paul
	Furlow, William L.	Rochester
	Furman, L. Christine	Minneapolis
	Furr, Leo	Bird Island
£	Fuster, Valentin	Rochester

G

	Gaard, Richard C.	Robbinsdale
	Gaebe, Milton B.	Clara City
	Gaertner, Frank M. J., Jr.	St. Paul
	Gaertner, John R.	St. Paul
	Gage, James R.	Minneapolis
	Gaida, Joseph B.	St. Cloud
	Gailitis, Veronika M.	St. Paul
	Gaither, Daniel W.	St. Paul
	Galbraith, Richard F.	Minneapolis
	Galejs, Aina	St. Paul
	Gall, Randall J.	Rochester
	Gallagher, Larry J.	Mound
	Gallett, Lester E.	Minneapolis
†	Galligan, John J.	St. Paul
†	Galligan, Margaret Mary D.	Minneapolis
	Galloway, Jackson R.	Alexandria, LA
	Galway, Charles F.	Minneapolis
†	Gambill, Carl M.	Rochester
†	Gambill, Earl E.	Rochester
	Gamble, Elbert J.	Roseville
	Gamble, William G.	Minneapolis
	Gamm, Edgar R.	Park Rapids
	Gannon, Paul G.	Minneapolis
	Garamella, Joseph J.	Minneapolis
	Garber, George L.	Winona
	Garber, James J.	Rochester
£	Gard, Joseph R.	Rochester
	Gardner, Jack K.	Fairmont
	Gardner, Walter P.	St. Paul
	Garetz, Floyd K.	Minneapolis
#	Garrick, James G.	Bethesda, MD
†	Garrow, Douglas M.	St. Paul
	Garske, George L.	Minneapolis
	Garten, Joseph L.	Minneapolis
	Garvey, James T.	Minneapolis
	Garvis, Gary E.	Minneapolis
	Gasik, Joseph M.	Minneapolis
	Gastineau, Clifford F.	Rochester
	Gault, N. L. Jr.	Minneapolis
	Gaute, Svend T.	St. Paul
	Gaviser, David	Minneapolis
	Gedgaudas, Eugene	Minneapolis
	Gedge, Stafford W.	Rochester
†	Gehlen, Joseph N.	St. Paul
*	Geib, Marvin J.	Fargo, N.D.
	Geis, LeRoy F.	Minneapolis
	Geiser, Peter M.	Alexandria
	Geist, Robert W.	St. Paul
	Geller, Joseph	Minneapolis
	Gendron, Joseph L.	Minneapolis
	Gentry, William C., Jr.	Minneapolis
	George, Vane P., Jr.	LeSueur
	Geraci, Joseph E.	Rochester
	Gerend, Thomas J.	Virginia
	Gerstenkorn, George B.	Milaca
	Gerster, Paul W.	Anoka
	Gesundheit, Sim	Minneapolis

	Geurs, Benjamin R.	Mankato
†	Ghostley, Mary C.	Bemidji
	Gibbs, Edward C.	St. Paul
£	Gibbs, Marvin K.	Rochester
	Gibbs, Robert W.	Minneapolis
	Giebenhain, John N.	Minneapolis
†	Giere, Joseph C.	Minneapolis
†	Giere, Richard W.	Minneapolis
†	Giere, Silas W.	Benson
£	Gifford, William A.	Rochester
	Gilbert, Maurice G.	Minneapolis
	Gilbertsen, A. Sigrid	Minneapolis
	Gilbertsen, Victor A.	Minneapolis
	Gilbertson, David L.	St. Paul
	Gilchrist, Milton R.	St. Paul
#	Gildersleeve, John W.	Ft. Sam Houston, TX
	Gill, Theodore M.	Albert Lea
	Gilles, Paul J.	Minneapolis
	Gilles, Thomas F.	Fairfax
	Gillespie, Delmar R.	St. Paul
£	Gillespie, Donald N.	Rochester
†	Gillespie, Malcolm G.	Duluth
	Gillund, T. Dean	Minneapolis
	Gilman, Lloyd C.	Willmar
£	Gilsanz, Vicente	Rochester
	Gilsdorf, Donald A.	St. Paul
†	Gingold, Benjamin A.	Minneapolis
	Gislason, Paul H.	Mankato
£	Gismondi, Pedro A.	Rochester
	Gjerde, William P.	Lake City
	Glaeser, John H.	Minneapolis
	Glass, David E.	Owatonna
	Glenny, William R.	St. Paul
	Glick, Dallas D.	Mountain Lake
	Glomstad, Gary B.	Grand Rapids
*†	Goblirsch, Andrew P.	Wayzata
	Godfrey, H. Wilson	Minneapolis
	Goehl, Reinhold O.	Minneapolis
	Goehrs, Gilman H.	St. Cloud
#	Goellner, John R.	APO San Francisco, CA
	Goetz, Frederick C.	Minneapolis
	Gokcen, Barbara W.	Minneapolis
	Gokcen, Muharrem	Minneapolis
†	Goldberg, Isadore M.	Minneapolis
	Goldberg, Marvin E.	Minneapolis
	Goldberg, Robert J.	St. Paul
	Goldberg, Stanley M.	Minneapolis
	Goldfarb, Benjie L.	Minneapolis
	Goldfarb, Mace G.	Minneapolis
	Goldish, Daniel R.	Duluth
	Goldish, Robert J.	Duluth
†	Goldman, Theodore I.	Minneapolis
	Goldner, Meyer Z.	Minneapolis
	Goldschmidt, Volker	Duluth
	Goldsmith, Joseph W.	St. Paul
	Goldstein, Alan L.	Hopkins

GOLDSTEIN-HALL

	Goldstein, Norman P.	Rochester
£	Goldyne, Marc E.	Rochester
	Goldston, Edgar C.	Rochester
	Goltz, Robert W.	Minneapolis
	Gonzales, Neva M.	St. Cloud
	Good, C. Allen, Jr.	Rochester
	Good, Gary	Minneapolis
	Good, Roy H.	Faribault
	Goodchild, William R.	Minneapolis
	Goodale, Robert L., Jr.	Minneapolis
	Goodall, David C.	Deer River
£	Goodenow, Thomas J.	Rochester
	Goodman, Ernest	St. Paul
	Goodnow, William H.	Duluth
	Goott, Bernard	St. Paul
	Gorden, A. Marc	International Falls
	Gordon, John R.	Minneapolis
	Gordon, Sewell S.	Minneapolis
	Gorman, Columb A.	Rochester
	Gould, Allan B., Jr.	Rochester
£	Gould, Barry K.	Rochester
£	Gould, Daniel B.	Rochester
#	Gould, Ronald J.	Anchorage, AL
	Gowan, Lawrence R.	Duluth
	Gowan, Lawrence R., Jr.	Duluth
	Gower, Walter E.	Duluth
	Gozum, Ekrem	Minneapolis
	Grabow, Jack D.	Rochester
	Grados, Carlos	Coon Rapids
	Graf, John A.	Rochester
	Grage, Theodor B.	Minneapolis
	Graham, Asa B.	Faribault
	Graham, John J.	Minneapolis
	Grahek, Jack P.	Ely
	Grande, David W.	Mankato
	Granquist, Richard D.	Minneapolis
	Grant, James B.	Minneapolis
	Grant, John C.	Sauk Centre
	Grant, Suzanne	Minneapolis
*†	Gratzek, Frank R.	Anoka
	Gravett, Desmond C.	Rochester
†	Gray, Royal C.	Minneapolis
#	Greden, John F.	Ft. Lee, VA
	Green, Clayton R.	Excelsior
	Green, John F.	Alexander
	Green, Paul A.	Rochester
	Green, Robert A.	Minneapolis
	Greenberg, Albert J.	Minneapolis
	Greene, Gordon	Hibbing
	Greene, Laurence F.	Rochester

	Greenc, Leonard H.	Minneapolis
	Greenfield, Theodore	Champlin
	Greenfield, Irving	Minneapolis
	Gregoire, Earl	Bemidji
£	Greipp, Philip R.	Rochester
¶	Greisheimer, Esther M.	Philadelphia, PA
	Gretsch, Gerald A.	St. Paul
	Grey, Mark A.	Waseca
#	Greydanus, Donald E.	Hawthorne, N.J.
	Gridley, John W.	St. Paul
	Griebie, Grant L.	Hutchinson
	Griffin, John W.	Bemidji
	Griffin, Patrick J.	St. Paul
	Griffin, Richard P.	Benson
	Grimes, Burton P.	St. Peter
	Grimes, Marian	Minneapolis
	Griesy, Carl U.	Two Harbors
	Grimes, Paul T.	Park Rapids
	Grimmell, Francis J.	Minneapolis
	Grinley, Andrew V.	Grand Rapids
†	Grinvalds, Anna O.	Cambridge
	Grohs, William H.	Duluth
	Gronquist, Y. K. J.	Cloquet
	Groover, Robert Vann	Rochester
	Grose, Frederick N.	Clarissa
	Gross, John B.	Rochester
	Grossling-Freudenburg, Sergio	Minneapolis
	Grossling, Higinia	Minneapolis
	Groth, Mary K.	Detroit Lakes
	Grubbs, Larry T.	Rochester
	Grube, David W.	Minneapolis
	Gruys, Robert I.	Minneapolis
	Gudio, Felix A., Jr.	St. Paul
	Gruninger, Robert P.	St. Paul
	Guerrero, Rafael A.	Minneapolis
	Guilfoile, Pierre J.	Delano
£	Guller, Barbara	Rochester
	Gullickson, Glenn, Jr.	Minneapolis
	Gummit, Robert J.	St. Paul
	Gunlaugson, Frederick G.	Minneapolis
£	Gura, George M., Jr.	Rochester
	Gustafson, Paul O.	Minneapolis
	Gustafson, Robert W.	Granite Falls
	Gustason, Harold T.	Minneapolis
	Gustilo, Ramon B.	Minneapolis
	Gutenkauf, Jos. J.	Minneapolis
	Guthrie, J. Cameron	St. Paul
	Gutzmann, Bruce W.	Faribault
	Guy, Jack A.	New London
£	Gyory, Attila N.	Rochester

H

	Haas, Jack F.	Northfield
	Haas, John W.	Minneapolis
	Haase, Donald D.	Silver Bay
	Haavik, John E.	Duluth
£	Habein, Harold C.	Palo Alto, CA
	Haberle, Charles A.	Minneapolis
†	Haes, Julius E.	St. Peter
	Haesly, Warren W.	Winona
	Hagberg, Norman L.	Montevideo
	Hagedorn, Albert B.	Rochester
	Hagen, John D.	Austin
	Hagen, Kristofer	Minneapolis
	Hagen, Wayne S.	Minneapolis

	Haglin, John J.	Minneapolis
	Hahn, Richard G.	Rochester
	Haight, James W.	St. Paul
†	Haines, Samuel F.	Rochester
	Hakanson, Erick Y.	St. Paul
	Hakim, Ali A.	Minneapolis
	Halbert, John J.	Duluth
†	Halenbeck, Philip L.	St. Cloud
	Hall, Arthur M.	Minneapolis
	Hall, Barnard	St. Paul
	Hall, Frederick C.	Minneapolis
	Hall, Harry B.	Minneapolis
	Hall, Loren J.	Minneapolis

HALL-HEISE

	Hall, Wendell H.	Minneapolis	†	Hartfiel, William F.	St. Paul
†	Hallberg, Olav Erik	Rochester		Hartfield, James E., Jr.	Rochester
	Hallgren, Roger	Belle Plaine		Hartig, Marjorie	St. Paul
	Halliday, Phillip V.	Duluth		Hartig, Paul R.	Minneapolis
	Hallin, Roger P.	Worthington	†	Hartman, Evelyn E.	Minneapolis
†	Halloran, Walter H.	Jackson		Hartman, Glen W.	Rochester
	Halme, William B.	Wadena	¶	Hartmann, Ronald J.	Rochester
	Halper, Bernard	Hibbing		Hartnagel, Grant F.	Red Wing
	Halpern, David J.	Brewster		Hartung, Elmer H.	Claremont
£	Halpin, John A.	Rochester		Hartwich, Roger F.	Winona
	Halverson, D. G.	Highland, CA		Hartwig, John A.	Minneapolis
	Halverson, Kermit J.	Parkville		Harty, Jerome L.	Minneapolis
	Halverson, William G.	Madelia		Hartzell, Allan J.	Duluth
	Halvorsen, Daniel K.	Owatonna		Hartzler, Paul L.	Cambridge
	Halvorson, David C.	Northfield		Harvey, Clyde B.	Minneapolis
	Halvorson, Harold C.	Albert Lea		Hass, Frederick M.	Minneapolis
	Halvorson, James W.	Zumbrota		Hastings, Donald W.	Minneapolis
	Hambidge, Gove, Jr.	Minneapolis	¶	Hauff, Karen J.	Rochester
	Hamel, Arnold L.	Minneapolis		Hauge, Erling T.	Minneapolis
	Hamel, Joseph I.	Minneapolis	†	Hauge, Malvin I.	Marcell
	Hammar, Lawrence M.	Mankato		Haugen, George W.	Minneapolis
	Hammerstrom, Robert N.	Minneapolis		Haugen, John A.	Minneapolis
	Hammes, Ernest M., Jr.	St. Paul		Haus, Erhard	St. Paul
£	Hancock, William E.	Rochester		Hauser, Charles W.	St. Paul
	Handler, Seymour	Minneapolis		Hauser, Donald C.	Minneapolis
	Hanisch, Edward C., Jr.	Minneapolis	†	Hauser, Victor P.	St. Paul
	Hanlon, David G.	Rochester		Hauser, W. Allen	St. Paul
	Hannon, Donald W.	St. Paul		Havel, Robert J.	Minneapolis
†	Hansen, Cyrus O.	Minneapolis		Haven, Walter K.	Minneapolis
†	Hansen, Erling W.	Minnetonka	#	Havig, Terrance A.	Lexington, KY
	Hansen, Milo L.	Little Falls		Hawk, Dale J.	Rochester
†	Hansen, Olga S.	Minneapolis		Hawkinson, Harlan W.	St. Paul
	Hansen, Robert E.	Hibbing	†	Hawkinson, Raymond P.	Minneapolis
	Hansen, Rollin M.	Minneapolis		Hawley, George M. B., II	Red Wing
	Hansen, Theodore M.	Albert Lea		Hay, Lyle J.	Minneapolis
	Hanske, Edward A.	Minneapolis	#	Hayashi, Melvin M. K. W.	Belleville, IL
	Hanson, A. Stuart	Minneapolis		Hayes, Albert F.	St. Paul
£	Hanson, Ernest J., Jr.	Rochester		Hayles, Alvin B.	Rochester
	Hanson, Ernest O.	Cloquet		Haywa, E. William	Minneapolis
†	Hanson, Harlow J.	Minneapolis		Hazen, Richard W.	Willmar
	Hanson, Harold B.	Burnsville	*†	Head, Douglas P.	Minneapolis
	Hanson, Harold W.	Minneapolis		Heagle, C. Russell	Waconia
	Hanson, Lewis	Frost		Hebbel, Robert	Minneapolis
	Hanson, Mark C. L.	Minneapolis	†	Hebeisen, Milton B.	Chaska
	Hanson, Mildred S.	Minneapolis	†	Heck, Frank J.	Rochester
	Hanson, Norbert O.	Rochester	†	Heck, William W.	St. Paul
§	Hanson, Mark T.	White Bear Lake		Hedemark, Homer H.	Ortonville
¶	Hanson, Phyllis	Rochester	†	Hedemark, Truman A.	Ortonville
	Hanson, Stephen L.	Minneapolis		Hedenstrom, Charles W.	St. Paul
†	Hanson, William A. H.	Minnetonka	†	Hedenstrom, Frank G.	St. Paul
	Hanson, William B.	Minneapolis		Hedenstrom, Philip C.	Marshall
	Hanton, Edward M.	St. Paul		Hedenstrom, Richard H.	St. Paul
	Harbaugh, John T.	St. Cloud	*†	Hedlund, Charles J.	Tucson, AZ
£	Harder, Edward J.	Rochester		Hedrick, William L.	Minneapolis
†	Hargraves, Malcolm M.	Rochester		Heegaard, William G.	Alexandria
	Harkness, John W.	Minneapolis		Hegrenes, Robert L.	Hutchinson
	Harmon, Gaius E.	St. Paul		Hegstad, Thomas C.	Windom
	Harper, David G.	Duluth	†	Heiam, William C.	Cook
†	Harrington, Stuart W.	Rochester		Heiberg, Olaf M.	Worthington
	Harrington, Vernon A.	Duluth		Heid, James K.	Little Falls
	Harris, Boyd L.	St. Paul	¶	Heidel, Werner	Rochester
	Harris, James E.	Minneapolis		Heimark, John J.	Mankato
	Harris, John E.	Minneapolis		Heimel, Albert J.	St. Paul
	Harris, Leon D.	Minneapolis	£	Heinberg, Charles E.	Rochester
	Harris, Max E.	St. Paul	£	Heine, Karl G.	Rochester
	Harrison, Percy W.	Worthington		Heinz, Ivy B.	Shakopee
	Harrison, William C.	Minneapolis		Heinz, John N.	Minneapolis
	Hart, Terril H.	Wayzata		Heinzerling, Carl R.	Chaska
†	Hart, William E.	Monticello		Heise, Carl vR	Winona
				Heise, Herbert vR	Winona

CHANDLER-CRAIG

Chandler, William M.	Minneapolis	£	Cohen, Manley	Long Beach, CA
† Chatterton, Carl C.	St. Paul		Cohen, Sumner S.	Minneapolis
Chawla, Ramesh C.	St. Cloud		Coifman, Robert E.	Minneapolis
Chedister, Charles R.	Minneapolis		Colago, Victor M.	Browns Valley
Chermak, Francis G.	Phoenix, AZ		Colby, Malcolm Y., Jr.	Rochester
Chervenak, William A.	St. Paul	†	Colby, Woodard L.	St. Paul
£ Chesebro, James H.	Rochester		Cole, George A.	Albert Lea
Chesler, Merrill D.	Minneapolis		Cole, James S.	Minneapolis
£ Chiavetta, Stephen V., Jr.	Rochester		Cole, Wallace H.	St. Paul
£ Chidlow, Judd H.	Rochester		Coleman, John B.	St. Paul
Child, Sherman B.	Minneapolis	#	Coleman, Robert L.	Whiteman AFB, MO
Childs, Donald S., Jr.	Rochester		Coleman, Thomas P.	Minneapolis
£ Chilgren, Keith V.	St. Paul		Coll, James J.	Duluth
Chisholm, Tague C.	Minneapolis	£	Collins, Eugene	Rochester
Chizek, David	St. Paul		Collins, Roger T.	Duluth
Choithani, C. M.	Crookston		Collenge, James H.	Detroit Lakes
Choithani, H. C.	Crookston		Colliton, Patrick A.	Moorhead
Chou, Shelley N.	Minneapolis		Colman, Edward L.	Fergus Falls
Christensen, Clarence H.	Duluth		Colosey, Fredericks	Virginia
† Christensen, Eli E.	Winona		Colton, Roger S.	St. Paul
Christensen, Lewellyn E.	Minneapolis	£	Colville, David	Rochester
Christensen, Norman A.	Rochester		Comfort, Thomas H.	St. Paul
£ Christensen, Robert D.	Rochester	£	Conley, Dean R.	Rochester
£ Christenson, Carl E.	Brighton		Conley, Robert H.	Mankato
Christenson, Leland R.	Minneapolis		Conlin, F. Dixon	Bismarck, N.D.
Christgau, Roger A.	Minneapolis		Conlon, Daniel C.	Minneapolis
Christian, William L.	Minneapolis		Conn, Doyt L.	Rochester
Christiana, Richard L.	Rochester	£	Conn, Richard L.	Rochester
# Chumbley, Lee C.	Patuxent River, MD		Connolly, Coleman J.	St. Paul
Chunn, Stanley S.	Willmar		Connolly, Joseph P.	So. St. Paul
Church, Gerald E.	Two Harbors	†	Connor, Charles E.	St. Paul
Churchill, Jane	Park Rapids	£	Connor, David G.	San Francisco, CA
£ Chychota, Norman N.	Rochester	*†	Cook, Edward N.	Rochester
Cich, John A.	Minneapolis	£	Cooke, Nelson R.	Rochester
Ciriacy, Edward W.	Minneapolis		Coombs, Carl H.	Cass Lake
£ Citron, Joseph	Minneapolis	£	Cooney, William P.	Rochester
Clapp, Hubert D.	Crookston		Cooper, Charles C.	Moose Lake
† Clark, Edward C.	San Francisco, CA	£	Cooper, George IV	Rochester
Clark, Elizabeth A. (Mrs. Halbert)	Duluth		Cooper, Jack M.	St. Paul
Clark, Harry B.	St. Cloud		Cooper, John P.	Minneapolis
Clark, Ivan T.	Sun City, AZ		Cooper, Robert R.	Minneapolis
† Clark, Leslie W.	Manchester, IA		Cooper, Talbert	Rochester
Clark, Malcolm D.	Minneapolis	#	Cooperman, Avram M.	Wichita Falls, TX
Clark, Robert S.	Minneapolis		Cope, Hershel B.	Virginia
Clark, W. Bruce	St. Paul	†	Corbin, Kendall B.	Rochester
Clarke, Dean T.	Faribault	†	Corniea, Albert D.	Minneapolis
Clarke, John W.	Waconia	£	Corrado, Angelini	Rochester
Clay, Lyman B.	Minneapolis		Correa, Dale H.	Minneapolis
Cleary, John	St. Paul		Corrigan, Cyril J.	Rochester
£ Clement, Denis L.	Rochester		Corson, Wilfred A.	Minneapolis
Clifford, George W.	Alexandria	£	Cortese, Denis A.	Rochester
Clifford, Thomas M.	Silver Bay		Cortez, Daniel P.	Minneapolis
Clifton, Theodore A.	Hollywood, FL		Cosgriff, James A., Jr.	Olivia
Cline, David W.	Minneapolis		Cotton, Gerald E.	Duluth
Clothery, Martin G.	Grand Rapids		Coulter, Harold E.	Minneapolis
Close, Gerald A.	Glencoe	*†	Countryman, Roger S.	Vancouver, B.C., Canada
Closuit, Frederick	Aitkin	#	Courteau, Robert D.	Ginelo, Rhodesia
Cochrane, Byron B.	St. Paul		Coventry, Markham B.	Rochester
Cochrane, Ray F.	Minneapolis		Coventry, William D.	Duluth
Coddon, Walter D.	St. Paul		Covey, Kenneth W.	Moorhead
Cody, D. Thane	Rochester		Cowan, Donald W.	Minneapolis
Cody, Michael C.	Rochester		Cowan, Gary A.	Duluth
Coe, John I.	Minneapolis		Cowan, George M.	Duluth
Coe, Robert O.	Virginia		Cowger, Robert C.	Farmington
Cofield, Robert H.	Rochester		Cox, Milton J.	Duluth
Cohan, Richard C.	Minneapolis		Cox, Russell L.	Spirit Lake, Iowa
Cohen, Bernard A.	Minneapolis		Coy, Douglas J.	Grand Rapids
Cohen, Ephraim B.	Minneapolis		Coyne, Terrence	Minneapolis
Cohen, Henry W.	Wayzata		Craig, David M.	St. Paul

Craig, M. Elizabeth	Minneapolis	Crutchfield, Charles E.	St. Paul
Cram, Barclay M.	St. Paul	Crutchfield, Susan E.	St. Paul
Cramer, Glen G.	New Brighton	Cruz, Waldemar F.	Minneapolis
† Cranmer, Richard R.	Laguna Hills, CA	Cuderman, Bert S.	Duluth
Cranston, Robert W.	Minneapolis	Cullado, Andronic F.	Minneapolis
Creedy, Charles D.	Minneapolis	# Cullen, Robert M.	Elmore
Creps, James R.	Duluth	Culligan, David E.	St. Paul
Cress, Thomas L.	St. Cloud	Culligan, John A.	St. Paul
Crislip, George D.	Waconia	Culligan, Leo C.	Minneapolis
Croissant, Raymond C.	Minneapolis	Culp, Clyde E.	Rochester
† Cronwell, Bernhard J.	Austin	Culp, Ormond S.	Rochester
£ Crossley, Kent B.	Newtonville, MA	Culver, Lucian G.	St. Paul
£ Crout, James E.	Rochester	Cumming, Edward D.	St. Paul
Crow, Earl R.	Minnetonka	Cumming, Robert J.	St. Cloud
Crow, George M.	International Falls	Cundy, Donald T.	Minneapolis
£ Crowder, David F.	Rochester	Cupps, Roger E.	Rochester
Crowley, James H.	St. Paul	Curran, John P.	Minneapolis
Crowley, Leonard V.	Minneapolis	Cushing, Richard T.	Minneapolis
Crudo, Vincent D.	St. Paul	† Cutts, George	Minneapolis
Crum, Arthur Z.	St. Paul		

D

Daehlin, Rolf	Fergus Falls	Dearing, William H.	Rochester
Dagg, Earl	Thief River Falls	Deason, Keith B.	Chisago City
Daggett, Donald R.	Minneapolis	Deaton, Burrell H.	Minneapolis
Dahl, James C.	Minneapolis	¶ DeBus, Robert L.	Rochester
† Dahl, John A.	Excelsior	Decker, Charles W.	Hibbing
Dahlin, David C.	Rochester	Decker, David G.	Rochester
Dahlquist, LaRue	St. Cloud	£ DeCourcy, Donald M., Jr.	Rochester
Dahlstrom, Donald D.	Minneapolis	DeCupas, Luis A.	St. Paul
Dale, Allan J. D.	Rochester	† Dedeker, Kenneth L.	Minneapolis
Dale, Les N.	Hastings	£ Deering, Timothy B.	Rochester
£ Daley, Dennis E.	Rochester	Degallier, Daniel	Winona
Daly, Alfred E.	St. Paul	# Deger, Grant E.	Fairchild, AFB, WA
Damberg, Sheldon W.	St. Paul	DeHaan, Eddie D.	Minneapolis
£ Daniel, Britt	Rochester	Delahunty, John R.	Red Wing
† Daniel, Donald H.	Wayzata	deLeon, Buenaventura	Stillwater
Daniel, Clarke G.	Minneapolis	Delmore, Jack	Roseau
Danielson, Lennox	Litchfield	Delzell, Allen W.	Minneapolis
Danoff, David	Minneapolis	De Marais, Lloyd C.	Hibbing
Danyluk, Michael	Minneapolis	£ DeMeester, Lee J.	Rochester
£ Dargaville, Richard M.	Rochester	Demo, Robert A.	Albert Lea
Dargay, Cyril P.	Minneapolis	Derauf, Donald E.	St. Paul
£ Daugherty, Guy W.	Rochester	£ Derbenwick, Kenneth P.	Rochester
Daumann, Roy F.	Minneapolis	£ Derbenwick, Mary June	Rochester
£ Dauphine, Richard T.	Rochester	Derechin, William	St. Paul
Davenport, Jay A.	Virginia	DeRemee, Richard A.	Rochester
David, Reuben	Hopkins	† de Souza e Silva, Nelson A.	Rochester
Davidson, A. Dale	Duluth	De Santo, Lawrence W.	Rochester
Davidson, J. Duane	Thief River Falls	Deters, Donald C.	St. Paul
£ Davidson, Michael J.	Rochester	Deutsch, Robert J.	Duluth
† Davis, Austin C.	Pompano Beach, FL	Devine, Kenneth D.	Rochester
Davis, Curtis E.	Minneapolis	Devloo, Robert A.	Rochester
£ Davis, David L.	Rochester	DeWeerd, James H.	Rochester
Davis, Edward V.	St. Paul	£ DeWeerd, James H., Jr.	Rochester
Davis, Eunice A.	St. Paul	Deweese, Joel T.	Bemidji
Davis, George D.	Rochester	Deweese, Wilford J.	Bemidji
† Davis, Lloyd T.	Wadena	deWerd, Robert W.	Owatonna
Davis, Luther F.	Wadena	Dewey, Donald H.	Owatonna
Davis, Michael W.	Minneapolis	Dey, James W.	Waseca
Davis, Raymond D.	Stockton, CA	Diamond, Robert A.	Minneapolis
Davis, Thomas H.	Minneapolis	£ Diaz-Buxo, Jose A.	Rochester
Davis, William E.	St. Paul	Dickinson, Paul B.	St. Paul
Davis, William I.	Moose Lake	Dickman, Roy W.	Minneapolis
Dawson, Lorin D.	Worthington	Didier, Edward P.	Rochester
Dawson, W. John, Jr.	Minneapolis	Diefenbach, Eugene J.	Minneapolis
		Diego, Benito B.	Fridley

DIEHL-ELKEMA

† Diehl, Harold S.New York, NY
 Diehl, James J.Minneapolis
 Dieperink, WillemSt. Paul
 Dierker, Heinrich A.Minneapolis
 Diessner, Ardell W.Stillwater
 Diessner, Grant R.Rochester
 *† Diessner, Henry D.Hopkins
 Dillie, Donald E.Litchfield
 Dillenburg, Cyril J.Crookston
 Dimants, Janis, Jr.Minneapolis
 * Dimmick, Ivan C.Brainerd
 Dines, David E.Rochester
 † Dittrich, RaymondSt. Paul
 £ Djalilian, MohsenRochester
 Doan, Robert E.Wayzata
 † Dobbins, Donald V.Rochester
 Dobbs, Richard L.Duluth
 Dobler, Manfred G.Ely
 † Dobrin, Dale T.Minneapolis
 Dobson, Mervin W.Mankato
 Dobyms, James H.Rochester
 Docherty, John A.Edina
 Dockerty, Malcolm B.Rochester
 Docksey, John W.Willmar
 Dodds, William C.Detroit Lakes
 Dodson, Albertus F.Brainerd
 Doebler, Myron I.Bagley
 Doherty, Elmer M.New Prague
 Dokken, James H.Windom
 Doman, Victor W.Lakefield
 § Domino, Terry A.St. Paul
 Doms, Vernon A.Elbow Lake
 † Donaldson, Charles S.St. Cloud
 Donatelle, Edward P.Minneapolis
 £ Donoghue, Edmund R., Jr.Rochester
 § Donehower, Ross C.St. Paul
 Donoghue, Francis E.Rochester
 Donovan, Daniel L.New Brighton
 Dooley, Robert T.St. Paul
 Doren, Austen H.Little Fork
 † Dorge, Richard I.Minneapolis
 Dornbach, Robert A.Minneapolis
 Dorsey, George C., Jr.Minneapolis
 Dorsey, William E.Minneapolis
 Doscherholmen, AlfredMinneapolis
 Doty, JosephLittle Falls
 Dougan, Jerome W.Minneapolis
 Douglass, Bruce E.Rochester
 Douglass, Jesse E.Canon Falls
 do Vale, Joao M.Minneapolis
 Dover, James W.Mankato

£ Downey, Gale T.Rochester
 † Doxey, Gilbert L.Minneapolis
 Doyle, James R.Rochester
 £ Dozois, Roger R.Rochester
 Drage, Charles W.Minneapolis
 † Dredge, Thomas E.Minneapolis
 Dredge, Thomas E., Jr.Minneapolis
 Drexler, Charles J.Duluth
 Drexler, George W.Blue Earth
 Dreyling, Roger A.Eden Valley
 £ Drijanski, RubenRochester
 Drill, Frederick E.Minneapolis
 Drill, Herman E.Hopkins
 † Drips, Della G.Rochester
 £ Driscoll, Thomas P.Rochester
 Drucker, Franklin G.Bigfork
 Duane, Drake D.Rochester
 £ Du Boff, Stuart M.Rochester
 £ Dubois, David D.Rochester
 Dubois, Julian F.Sauk Center
 Duerr, Eleanor E.St. Paul
 Duffy, John L.St. Paul
 £ Dukes, Russell J.Rochester
 Dummer, Donald J.Minneapolis
 £ Dumesnil, Jean G.Rochester
 Duncan, Donald A.Minneapolis
 Duncan, James W.Moorhead
 Dunham, Charles K.St. Paul
 Dunkel, Thomas B.St. Louis Park
 Dunlap, David J.Minneapolis
 Dunlap, Earl H.Minneapolis
 Dunn, James P.St. Paul
 £ Dunn, John S.Rochester
 Dunn, Robert C.St. Paul
 Dunstan, Paul L.Willmar
 Dupont, Joseph A.Excelsior
 Durkin, John L.St. Paul
 Duryea, Willis M.Minneapolis
 Duryea, Willis M., Jr.Minneapolis
 Duthoy, Everette J.St. Paul
 Dutt, RaySt. Paul
 Duvall, Arndt J., IIISt. Paul
 Dvorak, Benjamin A.Minneapolis
 Dwan, Paul F.Minneapolis
 † Dworsky, Samuel D.Minneapolis
 Dwyer, John J.Duluth
 Dyck, Peter J.Rochester
 Dyer, John AllenRochester
 Dyrdal, Paul J.St. Paul
 Dysterheft, Adolf F.Gaylord
 Dzuibinski, Emil H.St. Cloud

E

Earl, John R.St. Paul
 Earl, Stephan H.Minneapolis
 Eaton, David B.Worthington
 Eberley, Tobe S.Benson
 Ebert, Richard V.Minneapolis
 Eckdale, John E.Marshall
 Eckerly, Jean R.Minneapolis
 Eckert, Joseph F.Mankato
 £ Eckman, Matthew J.Duluth
 Eckman, Philip F.Duluth
 Eckman, Philip L.Duluth
 Eckman, Ralph J.Duluth

Eder, Walter P.Minneapolis
 Edin, AndrewWinona
 Edmondson, Hugh A., Jr.Minneapolis
 Edwards, Laura E.St. Paul
 † Edwards, J. WillardSt. Paul
 Edwards, Jesse E.St. Paul
 Edwards, Lloyd G.St. Paul
 † Edwards, Richard B.St. Paul
 Edwards, Thomas J.St. Paul
 † Edwards, Walter G., Jr.Bethesda, MD
 Edwardson, Phillip L.St. Paul
 Eelkema, Herman H.St. Paul

EFTELAND-FEIGAL

	Efteland, Myles E.	Minneapolis
£	Egan, Ernest L.	Rochester
	Edge, Sanford G.	Albert Lea
	Eggert, Delmer C.	Mankato
	Eginton, Charles T.	Fargo, ND
	Ehlen, Charles P.	St. Cloud
†	Ehrlich, S. Paul	Minneapolis
	Eich, Matthew A.	Minneapolis
	Eichelberger, Dale L.	Willmar
	Eichenlaub, John E.	Minneapolis
	Eichhorn, Edmund P., Jr.	Minneapolis
£	Eichten, John G.	Minneapolis
	Eide, O. A.	Hancock
†	Eiden, Vera M.	Afton
	Eifrig, David E.	Minneapolis
	Eilers, Vincent E.	St. Paul
	Einzig, Mitchell J.	Wayzata
Z	Eisenberg, M. Michael	Minneapolis
	Eisenkees, C. F.	Mankato
	Eisenman, Walter	Hibbing
	Eisenstadt, William S.	Minneapolis
†	Eitel, George D.	Minneapolis
	Ekberg, Fred	Detroit Lakes
	Eklund, Carl D.	Duluth
†	Elkins, Earl C.	Rochester
	Ellertson, Leonard M.	Albert Lea
	Ellinger, Albert J.	Willmar
£	Ellingsen, Norman H.	Rochester
	Ellingson, Richard B.	Minneapolis
	Ellington, Anna L.	Minneapolis
	Elliott, Charles M.	Rochester
	Elliott, J. W.	Mankato
	Ellis, Cassius M. C.	Minneapolis
	Ellis, Earl W.	Elgin
	Ellis, John C., Jr.	Minneapolis
	Ellis, Ronald W.	St. Paul
	Ellison, Evan S.	Minneapolis
*†	Ellison, Frank E.	Monticello
	Ellwood, Paul M., Jr.	Minneapolis
	Elumba, Teodoro V.	St. Paul
	Emanuel, Karl W.	Duluth
†	Emerson, Edward C.	St. Paul
	Emerson, Edward C.	St. Paul
	Emerson, Edwin E.	Osakis
	Emerson, Robert K.	Rochester
†	Emmett, John L.	Rochester
	Emmons, Patrica R.	Vancouver, B.C., CA
	Emmons, Robert W.	St. Paul
†	Emond, Joseph S.	Farmington
	Emond, Joseph S., Jr.	Farmington
	Emslander, Richard F.	Rochester

†	Endress, Edward K.	St. Paul
	Engebretson, Paul	Alexandria
	Engel, Andrew G.	Rochester
	Engel, Joseph P.	Minneapolis
	Engel, William L.	Minneapolis
#	Engelberg, Jerry	Fairfield, CA
†	Engels, Edward P.	Lexington, KY
	Engelsjerd, Gerald L.	Duluth
	Engelstad, Wendell P.	Virginia
	England, Rodney W.	St. Paul
	Englund, Elvin F.	Minneapolis
	Engstrom, E. Duane	Minneapolis
	Engstrom, George	St. Peter
	Engstrom, Robert B.	Mankato
	Engwall, Richard L.	Minnetonka
	Enroth, Oscar E.	St. Paul
	Erdal, Ove A.	Albert Lea
	Erich, John B.	Rochester
†	Erickson, Alvin O.	Long Prairie
	Erickson, Carlton	Lindstrom
	Erickson, Donald J.	Rochester
	Erickson, Donald L.	St. Paul
	Erickson, Jeffery L.	Minneapolis
	Erickson, Laurence F.	Minneapolis
	Erickson, Myron E.	Minneapolis
	Erickson, Robert L.	Rosemount
	Erickson, Vernon D.	Grand Rapids
	Ericson, John E.	Minneapolis
	Ericsson, Kermit C.	Cambridge
	Erlanson, A. Cornell	St. Paul
	Erling, Carl B.	St. Paul
£	Ersek, Robert A.	Minneapolis
	Ersfeld, Murray P.	St. Paul
	Eselius, Erik P.	Minneapolis
	Esensten, Sidney	Minneapolis
	Espelien, Alan D.	St. Cloud
	Espinosa, Raul E.	Rochester
	Estrem, Ralph L.	Fergus Falls
	Estrem, Robert D.	Fergus Falls
#	Ettinger, David S.	Ft. Leavenworth, KS
£	Etzell, Paul S.	Rochester
	Etzwiler, Donnell D.	Minneapolis
	Eusebio, Ernesto	Minneapolis
	Eustermann, John J.	Mankato
†	Evans, Edward T.	Minneapolis
	Evans, James M.	Northfield
	Evans, Leslie M.	Sauk Rapids
	Evensta, John B.	Grand Rapids
	Everhart, Clarence E., Jr.	Minneapolis
	Everly, Stephan S.	Minneapolis
	Evison, Emerson O.	Duluth
	Ewens, George B.	Virginia

F

	Faber, John E.	Rochester
	Facer, George W.	Rochester
£	Falcone, James C.	Rochester
	Fallon, Virgil T.	Minneapolis
	Falls, John L.	Red Wing
	Farber, Abigail F.	Minneapolis
	Farber, Lawrence A.	Minneapolis
	Farber, Roger E.	Minneapolis
	Farley, Harrison H.	Minneapolis
	Farr, John D.	St. Paul
£	Farrell, Kenneth H.	Rochester
	Farrell, T. Edwin	Minneapolis
	Fasbender, Herman T.	Hastings

	Fauchald, Nils, Jr.	Red Wing
	Faul, Bennie C.	Worthington
£	Faulconer, Albert, Jr.	Rochester
	Faust, John H.	Northfield
£	Fawcett, Arthur M.	Renville
†	Fawcett, Keith R.	Duluth
#	Fay, Thomas M.	Oakland, CA
	Fedders, Skaidrite	Willmar
	Fedor, Robert	Willmar
	Fee, John G.	St. Paul
	Fehr, Peter E.	Minneapolis
	Feigal, David W.	Wayzata
	Feigal, Gary R.	Lake City

FEIGAL-FRYTAK

Feigal, William M.Fairmont
 Feinberg, PhilipMinneapolis
 Feinberg, Samuel B.Minneapolis
 £ Feist, Donald J.Rochester
 Felder, Davitt A.St. Paul
 Feldmann, Floyd M.Pompano Beach, FL
 Felion, Arthur J.St. Paul
 Fenske, Arnold W.Winona
 Ferguson, John N.St. Paul
 Ferguson, Richard H.Rochester
 Fernandez, Rafael F., Jr.Minneapolis
 Ferrell, Clarence R.Moose Lake
 £ Ferris, Deward O.Rochester
 Fesenmaier, Otto B.Los Angeles, CA
 † Fesler, Harold H.W. St. Paul
 Fetzek, Albert D.Minneapolis
 Feuling, John C.Sun City, AZ
 £ Fibuch, Eugene E.Rochester
 Field, Charles W.Hopkins
 Fifer, Ellen Z.St. Paul
 Fifer, William R.Minneapolis
 Fifield, Malcolm M.Duluth
 £ Filbuch, Eugene E.Rochester
 Filiatrault, L. J.Coon Rapids
 Filipovich, Orest N.Minneapolis
 Fingermaier, David L.Minneapolis
 Fink, Daniel L.St. Paul
 # Fink, Lawrence H.Bethesda, MD
 † Fink, Leo W.Minneapolis
 £ Fink, Richard A.Rochester
 Fink, Robert J.Minneapolis
 Finkelnburg, William O.Winona
 Finkelstein, JoelMinneapolis
 Finlayson, Richard E.Minneapolis
 Finstad, James E.Minneapolis
 Fiore, Joseph P.Rochester
 £ Fischer, Albert P.Minneapolis
 Fischer, Robert F.St. Paul
 Fish, Charles R.Rochester
 Fisher, Don H.Minneapolis
 Fisher, Howard W.Minneapolis
 Fisher, Isadore I.Minneapolis
 Fisketti, HenryDuluth
 Fitch, Charles G.Worthington
 Fitzsimons, William E.Brainerd
 £ Fitzgerald, Robert H.Rochester
 £ Fitzgerald, Robert H., Jr.Rochester
 † Flancher, Leon H.Detroit Lakes
 # Flanigan, Donald J.Pensacola, FL
 Flannery, Hubert F.St. Paul
 Fleming, Dean S.Minneapolis
 Flemenbaum, AbrahamMinneapolis
 Fleming, Janice L.St. Paul
 # Flick, William F.Cheyenne, WY
 Fliehr, Richard R.Minneapolis
 Flinn, James B.Redwood Falls
 Floersch, Adrian J.Owatonna
 Flom, Reynold P.St. Paul
 Flom, Robert S.St. Paul
 Flora, George C.Minneapolis
 Florence, David W.St. Paul
 Florine, Martin C.Madison Lake
 Flory, William D.Minneapolis
 Fluegel, John O.Minneapolis
 Flynn, Bernard F.Hibbing
 Flynn, Louis L., Jr.St. Paul
 Foderick, John W.Hastings
 Foderick, Peter P.Ada

Fogelberg, Emil J.St. Paul
 Foker, Leslie W.Minneapolis
 Foley, Robert R.Minneapolis
 Foley, William A.Minneapolis
 £ Folger, Walter N.St. Paul
 Folsom, Louis B.Minneapolis
 Foni, Iancu F.Faribault
 Fontana, Robert S.Rochester
 Forbes, Edward F.Minneapolis
 £ Fordyce, Richard A.Rochester
 Foreman, Richard T.St. Paul
 £ Forgacs, PierreRochester
 Forsythe, James R.St. Paul
 Fortier, George M. A.Little Falls
 Fortier, George M. A., Jr.Little Falls
 Fortier, Rene G.Mankato
 Fortuny, Ignacio E.Minneapolis
 Foss, Donald L.Minneapolis
 † Foss, Edward L.Condon, MT
 Foster, Orley W.Minneapolis
 Foulk, William T., Jr.Rochester
 Fox, Donald P.St. Paul
 Fox, James RogersMinneapolis
 Fox, LeRoy J.St. Paul
 Fraley, Elwin E.Minneapolis
 † Franchere, Frederick W.Lake Crystal
 † Francis, David W.Morristown
 Franckowiak, J. L.Mankato
 Frane, Donald B.Minneapolis
 Frane, Gerald T.Minneapolis
 Franklin, Gordon W.Northome
 £ Fraser, Richard A.Rochester
 † Frederickson, Alice C.Willmar
 Frederickson, David L.Duluth
 Fredlund, Jon S.Anoka
 Freeman, Charles D., Jr.St. Paul
 Freeman, Craig W.Minneapolis
 Freeman, Donald H.Minneapolis
 Freeman, Donald W.St. Louis Park
 £ Freeman, Richard E.Rochester
 French, Bayard T.Hibbing
 French, Lyle A.Minneapolis
 Frericks, Roger L.Fergus Falls
 £ Freshman, John R.Rochester
 Frethem, Allen A.Rochester
 Frey, Richard J.Minneapolis
 Friberg, Joseph B.Minneapolis
 † Fricke, Robert E.Rochester
 Fried, Louis A.Minneapolis
 † Friedell, AaronMinneapolis
 Friedell, GeorgeMinneapolis
 Friedlieb, Oskar P.Virginia
 Friedman, Harry S.Minneapolis
 Friedrich, Bradford E.Red Wing
 Friend, Charles A.Minneapolis
 † Fritsche, AlbertNew Ulm
 Fritsche, Carl J.New Ulm
 Fritsche, Theodore R.New Ulm
 Fritz, Wallace L.St. Paul
 *† Froats, Charles W.St. Paul
 Fromke, Vincent L.Minneapolis
 Frost, John B.Minneapolis
 Frost, John W.St. Paul
 Fruchtman, Stanley A.Minneapolis
 £ Fruen, Paul R.St. Paul
 Frye, Charles W.St. Paul
 Frys, Russell N.Minneapolis
 £ Frytak, StephenRochester

FUGLESTAD-GOLDSTEIN

#	Fuglestad, Edson V.	Minneapolis
	Fuglestad, J. Roald	Minnetonka
†	Fuller, Alice H.	Minneapolis
	Fuller, Benjamin F.	White Bear Lake
	Fuller, Josiah	Duluth
†	Funk, Victor K.	Hopkins

	Funke, Joyce L.	St. Paul
	Furflow, William L.	Rochester
	Furman, L. Christine	Minneapolis
	Furr, Leo	Bird Island
£	Fuster, Valentin	Rochester

G

	Gaard, Richard C.	Robbinsdale
	Gaebe, Milton B.	Clara City
	Gaertner, Frank M. J., Jr.	St. Paul
	Gaertner, John R.	St. Paul
	Gage, James R.	Minneapolis
	Gaida, Joseph B.	St. Cloud
	Gailitis, Veronika M.	St. Paul
	Gaither, Daniel W.	St. Paul
	Galbraith, Richard F.	Minneapolis
	Galejs, Aina	St. Paul
	Gall, Randall J.	Rochester
	Gallagher, Larry J.	Mound
	Gallett, Lester E.	Minneapolis
	Galligan, John J.	St. Paul
†	Galligan, Margaret Mary D.	Minneapolis
	Galloway, Jackson R.	Alexandria, LA
	Galway, Charles F.	Minneapolis
†	Gambill, Carl M.	Rochester
†	Gambill, Earl E.	Rochester
	Gamble, Elbert J.	Rochester
	Gamble, William G.	Minneapolis
	Gamm, Edgar R.	Park Rapids
	Gannon, Paul G.	Minneapolis
	Garamella, Joseph J.	Minneapolis
	Garber, George L.	Winona
	Garber, James J.	Rochester
£	Gard, Joseph R.	Rochester
	Gardner, Jack K.	Fairmont
	Gardner, Walter P.	St. Paul
	Garetz, Floyd K.	Minneapolis
#	Garrick, James G.	Bethesda, MD
†	Garrow, Douglas M.	St. Paul
	Garske, George L.	Minneapolis
	Garten, Joseph L.	Minneapolis
	Garvey, James T.	Minneapolis
	Garvis, Gary E.	Minneapolis
	Gasik, Joseph M.	Minneapolis
	Gastineau, Clifford F.	Rochester
	Gault, N. L. Jr.	Minneapolis
	Gaute, Svend T.	St. Paul
	Gaviser, David	Minneapolis
	Gedgaudas, Eugene	Minneapolis
	Gedge, Stafford W.	Rochester
†	Gehlen, Joseph N.	St. Paul
*	Geib, Marvin J.	Fargo, N.D.
	Geis, LeRoy F.	Minneapolis
	Geiser, Peter M.	Alexandria
	Geist, Robert W.	St. Paul
	Geller, Joseph	Minneapolis
	Gendron, Joseph L.	Minneapolis
	Gentry, William C., Jr.	Minneapolis
	George, Vane P., Jr.	LeSueur
	Geraci, Joseph E.	Rochester
	Gerend, Thomas J.	Virginia
	Gerstenkorn, George B.	Milaca
	Gerster, Paul W.	Anoka
	Gesundheit, Sim	Minneapolis

	Geurs, Benjamin R.	Mankato
†	Ghostley, Mary C.	Bemidji
	Gibbs, Edward C.	St. Paul
£	Gibbs, Marvin K.	Rochester
	Gibbs, Robert W.	Minneapolis
	Giebenhain, John N.	Minneapolis
†	Giere, Joseph C.	Minneapolis
†	Giere, Richard W.	Minneapolis
†	Giere, Silas W.	Benson
£	Gifford, William A.	Rochester
	Gilbert, Maurice G.	Minneapolis
	Gilbertsen, A. Sigrid	Minneapolis
	Gilbertsen, Victor A.	Minneapolis
	Gilbertson, David L.	St. Paul
	Gilchrist, Milton R.	St. Paul
#	Gillersleeve, John W.	Ft. Sam Houston, TX
	Gill, Theodore M.	Albert Lea
	Gilles, Paul J.	Minneapolis
	Gilles, Thomas F.	Fairfax
	Gillespie, Delmar R.	St. Paul
£	Gillespie, Donald N.	Rochester
†	Gillespie, Malcolm G.	Duluth
	Gillund, T. Dean	Minneapolis
	Gilman, Lloyd C.	Willmar
£	Gilsanz, Vicente	Rochester
	Gilsdorf, Donald A.	St. Paul
†	Gingold, Benjamin A.	Minneapolis
	Gislason, Paul H.	Mankato
£	Gismondj, Pedro A.	Rochester
	Gjerde, William P.	Lake City
	Glaeser, John H.	Minneapolis
	Glass, David E.	Owatonna
	Glenny, William R.	St. Paul
	Glick, Dallas D.	Mountain Lake
	Glomstad, Gary B.	Grand Rapids
*†	Goblirsch, Andrew P.	Wayzata
	Godfrey, H. Wilson	Minneapolis
	Goehl, Reinhold O.	Minneapolis
	Goehrs, Gilman H.	St. Cloud
#	Goellner, John R.	APO San Francisco, CA
	Goetz, Frederick C.	Minneapolis
	Gokcen, Barbara W.	Minneapolis
	Gokcen, Muharrem	Minneapolis
†	Goldberg, Isadore M.	Minneapolis
	Goldberg, Marvin E.	Minneapolis
	Goldberg, Robert J.	St. Paul
	Goldberg, Stanley M.	Minneapolis
	Goldfarb, Benjie L.	Minneapolis
	Goldfarb, Mace G.	Minneapolis
	Goldish, Daniel R.	Duluth
	Goldish, Robert J.	Duluth
†	Goldman, Theodore I.	Minneapolis
	Goldner, Meyer Z.	Minneapolis
	Goldschmidt, Volker	Duluth
	Goldsmith, Joseph W.	St. Paul
	Goldstein, Alan L.	Hopkins

GOLDSTEIN-HALL

Goldstein, Norman P.Rochester
 £ Goldyne, Marc E.Rochester
 Goldston, Edgar C.Rochester
 Goltz, Robert W.Minneapolis
 Gonzales, Neva M.St. Cloud
 Good, C. Allen, Jr.Rochester
 Good, GaryMinneapolis
 Good, Roy H.Faribault
 Goodchild, William R.Minneapolis
 Goodale, Robert L., Jr.Minneapolis
 Goodall, David C.Deer River
 £ Goodenow, Thomas J.Rochester
 Goodman, ErnestSt. Paul
 Goodnow, William H.Duluth
 Goott, BernardSt. Paul
 Gorden, A. MarcInternational Falls
 Gordon, John R.Minneapolis
 Gordon, Sewell S.Minneapolis
 Gorman, Columb A.Rochester
 Gould, Allan B., Jr.Rochester
 £ Gould, Barry K.Rochester
 £ Gould, Daniel B.Rochester
 Gould, Ronauld J.Anchorage, AL
 Gowan, Lawrence R.Duluth
 Gowan, Lawrence R., Jr.Duluth
 Gower, Walter E.Duluth
 Gozum, EkremMinneapolis
 Grabow, Jack D.Rochester
 Grados, CarlosCoon Rapids
 Graf, John A.Rochester
 Grage, Theodor B.Minneapolis
 Graham, Asa B.Faribault
 Graham, John J.Minneapolis
 Grahek, Jack P.Ely
 Grande, David W.Mankato
 Granquist, Richard D.Minneapolis
 Grant, James B.Minneapolis
 Grant, John C.Sauk Centre
 Grant, SuzanneMinneapolis
 † Gratzek, Frank R.Anoka
 † Gravett, Desmond C.Rochester
 # Gray, Royal C.Minneapolis
 Greden, John F.Ft. Lee, VA
 Green, Clayton R.Excelsior
 Green, John F.Alexander
 Green, Paul A.Rochester
 Green, Robert A.Minneapolis
 Greenberg, Albert J.Minneapolis
 Greene, GordonHibbing
 Greene, Laurence F.Rochester

Greene, Leonard H.Minneapolis
 Greenfield, TheodoreChamplin
 Greenfield, IrvingMinneapolis
 £ Gregoire, EarlBemidji
 Greipp, Philip R.Rochester
 † Greisheimer, Esther M.Philadelphia, PA
 Gretsck, Gerald A.St. Paul
 # Grey, Mark A.Waseca
 Greydanus, Donald E.Hawthorne, N.J.
 Gridley, John W.St. Paul
 Griebie, Grant L.Hutchinson
 Griffin, John W.Bemidji
 Griffin, Patrick J.St. Paul
 Griffin, Richard P.Benson
 Grimes, Burton P.St. Peter
 Grimes, MarianMinneapolis
 Griesy, Carl U.Two Harbors
 Grimes, Paul T.Park Rapids
 Grimmell, Francis J.Minneapolis
 Grinley, Andrew V.Grand Rapids
 † Grinvalds, Anna O.Cambridge
 Grohs, William H.Duluth
 Gronquist, Y. K. J.Cloquet
 Groover, Robert VannRochester
 Grose, Frederick N.Clarissa
 Gross, John B.Rochester
 Grossling-Freudenburg, SergioMinneapolis
 Grossling, HiginiaMinneapolis
 Groth, Mary K.Detroit Lakes
 Grubbs, Larry T.Rochester
 Grube, David W.Minneapolis
 Gruys, Robert I.Minneapolis
 Gudio, Felix A., Jr.St. Paul
 Gruninger, Robert P.St. Paul
 Guerrero, Rafael A.Minneapolis
 £ Guilfoile, Pierre J.Delano
 £ Guller, BarbaraRochester
 Gullickson, Glenn, Jr.Minneapolis
 Gumnit, Robert J.St. Paul
 Gunlaugson, Frederick G.Minneapolis
 £ Gura, George M., Jr.Rochester
 Gustafson, Paul O.Minneapolis
 Gustafson, Robert W.Granite Falls
 Gustason, Harold T.Minneapolis
 Gustilo, Ramon B.Minneapolis
 Gutenkauf, Jos. J.Minneapolis
 Guthrie, J. CameronSt. Paul
 Gutzmann, Bruce W.Faribault
 £ Guy, Jack A.New London
 £ Gyory, Attila N.Rochester

H

Haas, Jack F.Northfield
 Haas, John W.Minneapolis
 Haase, Donald D.Silver Bay
 Haavik, John E.Duluth
 £ Habin, Harold C.Palo Alto, CA
 Haberle, Charles A.Minneapolis
 Haes, Julius E.St. Peter
 Haesly, Warren W.Winona
 Hagberg, Norman L.Montevideo
 Hagedorn, Albert B.Rochester
 Hagen, John D.Austin
 Hagen, KristoferMinneapolis
 Hagen, Wayne S.Minneapolis

Haglin, John J.Minneapolis
 Hahn, Richard G.Rochester
 Haight, James W.St. Paul
 † Haines, Samuel F.Rochester
 Hakanson, Erick Y.St. Paul
 Hakim, Ali A.Minneapolis
 Halbert, John J.Duluth
 † Halenbeck, Philip L.St. Cloud
 Hall, Arthur M.Minneapolis
 Hall, BarnardSt. Paul
 Hall, Frederick C.Minneapolis
 Hall, Harry B.Minneapolis
 Hall, Loren J.Minneapolis

HALL-HEISE

	Hall, Wendell H.	Minneapolis	†	Hartfiel, William F.	St. Paul
†	Hallberg, Olav Erik	Rochester		Hartfield, James E., Jr.	Rochester
	Hallgren, Roger	Belle Plaine		Hartig, Marjorie	St. Paul
	Halliday, Phillip V.	Duluth		Hartig, Paul R.	Minneapolis
	Hallin, Roger P.	Worthington	†	Hartman, Evelyn E.	Minneapolis
†	Halloran, Walter H.	Jackson		Hartman, Glen W.	Rochester
	Halme, William B.	Wadena	¶	Hartmann, Ronald J.	Rochester
	Halper, Bernard	Hibbing		Hartnagel, Grant F.	Red Wing
	Halpern, David J.	Brewster		Hartung, Elmer H.	Claremont
£	Halpin, John A.	Rochester		Hartwich, Roger F.	Winona
	Halverson, D. G.	Highland, CA		Hartwig, John A.	Minneapolis
	Halverson, Kermit J.	Parkville		Harty, Jerome L.	Minneapolis
	Halverson, William G.	Madelia		Hartzell, Allan J.	Duluth
	Halvorsen, Daniel K.	Owatonna		Hartzler, Paul L.	Cambridge
	Halvorson, David C.	Northfield		Harvey, Clyde B.	Minneapolis
	Halvorson, Harold C.	Albert Lea		Hass, Frederick M.	Minneapolis
	Halvorson, James W.	Zumbrota		Hastings, Donald W.	Minneapolis
	Hambidge, Gove, Jr.	Minneapolis	¶	Hauff, Karen J.	Rochester
	Hamel, Arnold L.	Minneapolis		Hauge, Erling T.	Minneapolis
	Hamel, Joseph I.	Minneapolis	†	Hauge, Malvin I.	Marcell
	Hammar, Lawrence M.	Mankato		Haugen, George W.	Minneapolis
	Hammerstrom, Robert N.	Minneapolis		Haugen, John A.	Minneapolis
	Hammes, Ernest M., Jr.	St. Paul		Haus, Erhard	St. Paul
£	Hancock, William E.	Rochester		Hauser, Charles W.	St. Paul
	Handler, Seymour	Minneapolis		Hauser, Donald C.	Minneapolis
	Hanisch, Edward C., Jr.	Minneapolis	†	Hauser, Victor P.	St. Paul
	Hanlon, David G.	Rochester		Hauser, W. Allen	St. Paul
	Hannon, Donald W.	St. Paul		Havel, Robert J.	Minneapolis
†	Hansen, Cyrus O.	Minneapolis	#	Haven, Walter K.	Minneapolis
†	Hansen, Erling W.	Minnetonka		Havig, Terrance A.	Lexington, KY
	Hansen, Milo L.	Little Falls		Hawk, Dale J.	Rochester
†	Hansen, Olga S.	Minneapolis		Hawkinson, Harlan W.	St. Paul
	Hansen, Robert E.	Hibbing	†	Hawkinson, Raymond P.	Minneapolis
	Hansen, Rollin M.	Minneapolis		Hawley, George M. B., II	Red Wing
	Hansen, Theodore M.	Albert Lea		Hay, Lyle J.	Minneapolis
	Hanske, Edward A.	Minneapolis	#	Hayashi, Melvin M. K. W.	Belleville, IL
	Hanson, A. Stuart	Minneapolis		Hayes, Albert F.	St. Paul
£	Hanson, Ernest J., Jr.	Rochester		Hayles, Alvin B.	Rochester
	Hanson, Ernest O.	Cloquet		Haywa, E. William	Minneapolis
†	Hanson, Harlow J.	Minneapolis		Hazen, Richard W.	Willmar
	Hanson, Harold B.	Burnsville	*†	Head, Douglas P.	Minneapolis
	Hanson, Harold W.	Minneapolis		Heagle, C. Russell	Waconia
	Hanson, Lewis	Frost		Hebbel, Robert	Minneapolis
	Hanson, Mark C. L.	Minneapolis	†	Hebeisen, Milton B.	Chaska
	Hanson, Mildred S.	Minneapolis	†	Heck, Frank J.	Rochester
	Hanson, Norbert O.	Rochester	†	Heck, William W.	St. Paul
§	Hanson, Mark T.	White Bear Lake		Hedemark, Homer H.	Ortonville
¶	Hanson, Phyllis	Rochester	†	Hedemark, Truman A.	Ortonville
	Hanson, Stephen L.	Minneapolis		Hedenstrom, Charles W.	St. Paul
†	Hanson, William A. H.	Minnetonka	†	Hedenstrom, Frank G.	St. Paul
	Hanson, William B.	Minneapolis		Hedenstrom, Philip C.	Marshall
	Hanton, Edward M.	St. Paul		Hedenstrom, Richard H.	St. Paul
	Harbaugh, John T.	St. Cloud	*†	Hedlund, Charles J.	Tucson, AZ
£	Harder, Edward J.	Rochester		Hedrick, William L.	Minneapolis
†	Hargraves, Malcolm M.	Rochester		Heegaard, William G.	Alexandria
	Harkness, John W.	Minneapolis		Hegrenes, Robert L.	Hutchinson
	Harmon, Gaius E.	St. Paul		Hegstad, Thomas C.	Windom
	Harper, David G.	Duluth	†	Heiam, William C.	Cook
†	Harrington, Stuart W.	Rochester		Heiberg, Olaf M.	Worthington
	Harrington, Vernon A.	Duluth		Heid, James K.	Little Falls
	Harris, Boyd L.	St. Paul	¶	Heidel, Werner	Rochester
	Harris, James E.	Minneapolis		Heimark, John J.	Mankato
	Harris, John E.	Minneapolis		Heimel, Albert J.	St. Paul
	Harris, Leon D.	Minneapolis	£	Heinberg, Charles E.	Rochester
	Harris, Max E.	St. Paul	£	Heine, Karl G.	Rochester
	Harrison, Percy W.	Worthington		Heinz, Ivy B.	Shakopee
	Harrison, William C.	Minneapolis		Heinz, John N.	Minneapolis
	Hart, Terril H.	Wayzata		Heinzerling, Carl R.	Chaska
†	Hart, William E.	Monticello		Heise, Carl vR	Winona
				Heise, Herbert vR	Winona

HEISE-HOUSE

Heise, Paul vR	Winona	Hinckley, Robert G.	White Bear Lake
Heise, William vR	Winona	Hinderaker, Harris P.	Willmar
Heisel, John G.	Duluth	Hines, Edgar A., Jr.	Brevard, NC
Heiser, Don R.	Rochester	† Hiniker, Louis P.	St. Paul
Heithoff, Kenneth B.	Bloomington	† Hiniker, Peter J.	St. Peter
Held, William J.	St. Cloud	Hinz, Walter E.	Willmar
Helgaas, Steffen A.	Farmington	Hippchen, Ray C.	St. Paul
Helgason, Pall B.	Rochester	Hirsh, Stanton A.	Crookston
Heller, Ben I.	Minneapolis	* Hitchcock, Claude R.	Minneapolis
Heller, Edgar E.	Mankato	Ho, Shu Kang	St. Paul
Heller, Steven A.	Minneapolis	Hoagland, H. Clark	Rochester
Helmholz, Henry F., Jr.	Rochester	Hobday, H. Thomas	St. Cloud
† Helseth, Hovald K.	Fergus Falls	Hodapp, Robert V.	Willmar
Helwig, Karl L.	Virginia	Hodges, Kenneth V.	Minneapolis
Hempel, Dean J.	Minneapolis	¶ Hodgins, Carol L.	Rochester
Henderson, Edward D.	Rochester	£ Hodgson, Corrin H.	St. Paul
Henderson, John W.	Rochester	£ Hodgson, Corrin J.	Rochester
Henderson, Lowell L.	Rochester	Hodgson, Jane E.	St. Paul
Henderson, Terrance P.	White Bear Lake	Hodgson, John R.	Rochester
Hendricks, John L.	China Lakes, CA	Hoeg, Dwight C.	Duluth
Hengel, James A.	St. Paul	† Hoepfer, Philip G.	Chestnut Hill, MA
Hengstler, William H.	St. Paul	Hoff, Herbert O.	Duluth
Henke, Clarence E.	St. Paul	Hoffert, Henry E.	Minneapolis
Henke, Wilbert J.	St. Paul	Hoffman, David L.	Rochester
Henrikson, Earl C.	Minneapolis	Hoffman, Neil R.	Minneapolis
Henry, Clarence J.	Onamia	† Hoffman, Roy A.	Minneapolis
Henry, Harold W.	Moose Lake	Hoffman, Walter Lees	Minneapolis
Henry, James S.	St. Paul	Hofmann, Gerald N.	Minneapolis
Henry, John C.	Owatonna	£ Hogan, William M.	Rochester
Henry, Joseph E.	Milaca	Hoganson, Donald E.	Bemidji
Henry, Kenneth G.	Owatonna	Hohmann, Albert	St. Paul
Henwood, Wesley C.	Virginia	Holbrook, Margaret A.	Rochester
Hepper, Norman G.	Rochester	† Holcomb, Joel T.	Marine-on-the-St. Croix
Herber, Leo	Thief River Falls	Holland, C. R.	Rochester
Herbert, Willis L.	Minneapolis	Hollenhorst, Robert W.	Rochester
Hergott, Patrick F.	Waseca	Hollinshead, W. H.	St. Paul
Herland, Alexander L.	Winona	Holm, Donald F.	Minneapolis
Herman, Samuel E.	Fort Lauderdale, FL	Holm, Owen W.	Hibbing
Hermans, Paul E.	Rochester	Holman, Colin B.	Rochester
Herrell, Wallace	Rochester	Holmberg, Conrad J.	Minneapolis
Herrick, Donald W.	St. Paul	Holmstrom, Carle H.	Warren
Hertel, Garfield E.	McAllen, TX	Holstine, John D.	Fairmont
Hesla, Inman A.	Austin	Holt, Glen E.	Duluth
Hess, Carroll N.	Minneapolis	† Holt, John E.	St. Paul
Hess, Sheldon T.	Minneapolis	Holten, John	Moorhead
Hetzler, John A.	Minnetonka	Holzappel, Fred C.	Minneapolis
Heupel, Hermann W.	Minneapolis	Hom, Leong Y. W.	Fergus Falls
Hewitt, Edith S.	Rochester	Honath, Donald H.	Owatonna
Hewitt, Marshall I.	Minneapolis	Hood, Roderick P.	Duluth
Hiatt, John A.	Minneapolis	Hopkins, G. Wendell	Minneapolis
Hickok, David F.	Minneapolis	§ Hoppe, Wayne	Minneapolis
Hick, John F.	Winona	Hopperstad, J. Jerome	Minneapolis
Hiduchenko, Katherine	Minneapolis	Hoppes, Emerson E.	Minneapolis
Hildebrand, John E.	Bemidji	Horecki, Henry	Minneapolis
Hildebrandt, Walter C.	Minneapolis	Horns, Howard L.	Minneapolis
Hilding, Anderson C.	Duluth	Horns, Norman	Minneapolis
Hildreth, Thomas A.	San Francisco, CA	Horns, Richard C.	Minneapolis
Hilgedick, William R.	Minneapolis	Horowitz, Arthur J.	Minneapolis
Hilger, Jerome A.	St. Paul	£ Horswill, Robert N.	Rochester
Hilger, Laurence D.	St. Paul	† Horton, Bayard T.	Rochester
Hilgers, Robert D.	St. Paul	Hoseth, Wayne L.	Minneapolis
Hilgermann, George O.	Minneapolis	Hosfield, William B.	Minneapolis
Hilker, Marcus D.	St. Paul	Hottinger, George C.	St. Paul
Hilker, Robert T.	Owatonna	Hottinger, Raymond C.	Janesville
Hill, Charlotte W.	St. Paul	Houglum, Arvid J.	Duluth
Hill, David L.	Minneapolis	† Houkom, Bjarne	Fergus Falls
Hill, Earl	Minneapolis	† Houkom, S. Sverre	Duluth
Hill, Elmer M.	Minneapolis	Houle, Rollin J.	New Brighton
Hill, John R.	Rochester	Houlton, William H.	St. Paul
Hill, Richard W.	Rochester	House, James H.	Minneapolis
Hiller, Bruce H.	Minneapolis		

HOUSEHOLDER-JEUB

Householder, James R.	Minneapolis
Houser, Otis	Rochester
Houts, Joseph C.	Dassel
Hovde, Gordon W.	Lindstrom
Hovland, Melvin L.	Minneapolis
Hovland, Richard D.	Minneapolis
Howard, David	Long Prairie
Howard, Frank M., Jr.	Rochester
Howard, Malin L.	St. Paul
£ Howard, Richard J.	Edina
Howard, Robert B.	Minneapolis
Howard, Solomon E.	Minneapolis
Howe, Newell W.	West St. Paul
Howell, Carter W.	Minneapolis
Howell, John L.	Minneapolis
Howell, Llewelyn P.	Rochester
Hoyt, C. Sherman	Minneapolis
Hruza, William J.	Sioux Falls, SD
£ Hu, Chung-Hong	Rochester
Huber, Robert W.	St. Croix Falls, WI
Hubin, Edwin G.	Sandstone
Huebert, Dan W.	Hutchinson
£ Huerta, Enrique	Rochester
Huff, John S.	Minneapolis

Huffington, Herb L.	Waterville
† Huffington, Herbert L.	Brownsville, TX
Hughes, Bernard J.	St. Cloud
Hughes, Sidney O.	Winona
Hulteng, Donald B.	Minneapolis
Hunt, Arthur B.	Carmel, CA
Hunt, James C.	Rochester
Hunt, Kai K.	Alexandria
¶ Hunt, Max L.	Rochester
Hunt, Vincent R.	Minneapolis
Hung, Jui-Sung	Minneapolis
Hunter, Murray H.	Farmington
Hunter, Samuel W.	St. Paul
£ Hurley, Timothy J.	Rochester
Hurr, Maland C.	Minneapolis
Hurwitz, Milton M.	St. Paul
Huseby, Thomas L.	St. Paul
Husebye, Kjeld O.	St. Paul
Hustad, Edward G.	Minneapolis
# Huston, Kent A.	Wichita, KS
† Hutchinson, Henry	Minneapolis
Hymes, Alan C.	Minneapolis
† Hymes, Charles	Minneapolis
# Hynes, Kieran M.	Wright-Patterson AFB, OH

I

Iammatteo, Pat	Hibbing
Ibrahim, George W.	Virginia
Ide, Arthur W., Jr.	Minneapolis
Idstrom, Linneus G.	Minneapolis
Indeck, Walter	Minneapolis
Ingalls, Edgar G.	Minneapolis
£ Ireland, Damian C. R.	Rochester
† Ireland, Gerald W.	St. Paul
£ Irons, G. Benton	Rochester

# Isaacson, Ronald	Mathers AFB, CA
Isele, Reginald H.	Austin
£ Ivance, Richard J.	Rochester
Iverslie, Philip C.	Willmar
Iverson, Eleanor B.	Minneapolis
£ Iverson, Paul C.	Minneapolis
Iverson, Rolf M.	Minneapolis
Ivins, John C.	Rochester

J

Jackish, George E.	Red Wing
Jacklin, Alexander J.	Duluth
Jackman, Raymond J.	Rochester
£ Jackman, Steven	Rochester
£ Jackson, Charles B.	Rochester
Jackson, J. Albert	Minneapolis
Jackson, Richard L.	Minneapolis
Jackson, William C.	St. Paul
Jacobs, Douglas L.	Willmar
† Jacobson, Clarence	Chisholm
Jacobson, Clifford W.	Breckenridge
Jacobson, Dennis	Onamia
Jacobson, Ferdinand C.	Duluth
Jacobson, Leslie W.	Minneapolis
Jacobson, Loren J.	Minneapolis
Jacoby, John S.	Minneapolis
Jacobson, Wyman E.	Minneapolis
Jacott, William E.	Duluth
Jaeger, Dwight E.	St. Cloud
Jaffe, Manuel O.	Minneapolis
James, Ellery M.	St. Paul
James, John W.	St. Paul
Janda, George W.	Minneapolis

£ Jander, Hartwig P.	Rochester
Janecek, James, Jr.	St. Paul
Janecky, Allen G.	Baudette
Janes, Joseph M.	Rochester
Janssen, Martin E.	St. Paul
Jantunen, Kaucho I.	New York Mills
Jarvis, Charles W.	St. Paul
Jarvis, Mary B.	Minneapolis
Jastram, Rupert M.	St. Paul
Jay, Alan R.	Temple, TX
Jefferies, William L.	Minneapolis
Jensen, Alvin M.	Brownton
Jensen, Jame E.	Stillwater
Jensen, John A.	Crookston
Jensen, Nathan K.	Minneapolis
Jensen, Paul A.	Minneapolis
Jensen, Reynold A.	Minneapolis
Jensen, James E.	Stillwater
Jepson, William W.	Minneapolis
Jerome, Bourne	Minneapolis
Jerome, Elizabeth B. K.	Minneapolis
Jeronimus, Henry J.	Duluth
Jeub, Robert P.	Minneapolis

JEWSON-KARON

Jewson, Douglas V.	Duluth
£ Jibilian, Artin Y.	Rochester
Jimenez, Edward	Duluth
Johanson, James E.	Minneapolis
John, Byron L.	St. Cloud
Johnson, Alan R.	Minneapolis
Johnson, Aldridge F.	St. Paul
Johnson, Angelo G.	Minneapolis
Johnson, Arthur B.	Minneapolis
Johnson, Bradley D.	Minneapolis
Johnson, Byron P.	St. Paul
Johnson, Calvin J.	Grand Rapids
Johnson, Carl Edwin	St. Paul
Johnson, Carl Eric	Rochester
Johnson, Carolyn A.	St. Paul
† Johnson, C. Percy	Tyler
Johnson, Curtis A.	Minneapolis
Johnson, Curtis M.	Winona
Johnson, Daniel A.	Litchfield
Johnson, Daniel T.	St. Paul
Johnson, David R.	Minneapolis
Johnson, David W.	St. Paul
# Johnson, Donald A.	Minneapolis
Johnson, Douglas L.	Brainerd
Johnson, Edward A.	Minneapolis
† Johnson, Einer W.	Bemidji
Johnson, Einer W., Jr.	Rochester
Johnson, Frank E.	Minneapolis
Johnson, Franklin L.	Duluth
Johnson, Gordon E.	Minneapolis
Johnson, Harry A., Jr.	Minneapolis
Johnson, Herbert W.	St. Paul
† Johnson, James A.	Minneapolis
Johnson, John W.	Minneapolis
Johnson, Karl E.	Duluth
Johnson, Lyle O.	St. Paul
† Johnson, Luis F.	Rochester
£ Johnson, Marvin W.	Rochester
† Johnson, Norman P.	Minneapolis
Johnson, Norman Paul	St. Paul
† Johnson, Norton T.	Minneapolis
Johnson, O. Guy	St. Paul
† Johnson, Olga H.	Detroit Lakes
Johnson, Paul E.	Wayzata
Johnson, Phillip S.	Minneapolis

Johnson, Reinald G.	Minneapolis
Johnson, Rex R.	New Ulm
Johnson, Richard J.	St. Paul
Johnson, Richard S.	Minneapolis
Johnson, Richard V.	Minneapolis
Johnson, Robert E.	Minneapolis
Johnson, Robert H.	St. Paul
Johnson, Roger L.	St. Paul
Johnson, Stanley M.	White Bear Lake
Johnson, Theodore L.	Duluth
Johnson, Thomas E.	St. Paul
£ Johnson, Thomas F.	Orlando, FL
Johnson, Thomas H., Jr.	Minneapolis
Johnson, Vilhelm M.	Dawson
£ Johnson, Warren L., Jr.	Rochester
Johnson, William E.	St. Cloud
Johnson, William J.	Rochester
Johnson, Youbert T.	Minneapolis
* Johnsrud, Luverne W.	Hibbing
# Johnston, Bemis H.	Eatontown, NJ
Johnston, Donald K.	Minneapolis
Johnston, H. Wayne	Virginia
Johnston, Leonard F.	Winona
Jones, David G.	Minneapolis
† Jones, Herbert W., Jr.	Minneapolis
£ Jones, Ian V.	Rochester
† Jones, Orville H.	Mankato
Jones, Richard H.	Minneapolis
† Jones, Richard N.	St. Cloud
* Jordan, Donald V.	Minneapolis
¶ Jordan, Kathleen B. Smith	Granite Falls
Jorgensen, Edward O.	Rochester
Jorgensen, Donald R.	Willmar
Jorgensen, Harlan	Minneapolis
Joseph, Arnold H.	St. Paul
Joyce, John W.	Rochester
Judd, Allen S.	Minneapolis
Judd, Edward S.	Rochester
Judd, Walter H.	Washington, D.C.
† Juergens, Herman M.	Belle Plaine
* Juergens, Manley F.	Stillwater
Juers, Edward H.	Red Wing
Juntunen, Roy R.	Duluth
† Jurdy, Mitchell	Minneapolis
† Just, Herman J.	Hastings

K

Kaczrowski, William M.	Marshall
Kadesky, Harold B.	Minneapolis
# Kaese, Werner E.	Rochester
Kaine, Richard F.	St. Albans, NY
Kaiser, Harold B.	Minneapolis
Kaiser, Milton L.	New Ulm
Kalb, Thomas J.	Minneapolis
† Kallestad, Leonard L.	Minneapolis
Kaminski, Gregory W.	Redwood Falls
Kampen, Charles D.	Grand Rapids
Kane, Dennis J.	Minneapolis
Kane, Morton C.	Minneapolis
Kane, William J.	Chicago, IL
# Kanne, Earl R.	Brainerd
Kantack, Paul W.	Keesler, MS
Kantar, Yale C.	St. Paul

Kaplan, Arnold P.	Minneapolis
Kaplan, David H.	Edina
Kaplan, J. Jacob	Minneapolis
Kaplan, Martin B.	Minneapolis
£ Kaplan, Roy A.	Rochester
Kapps, F. Donald	St. Paul
Karges, Laurel E.	Grand Rapids
Karish, Louis J.	Grand Rapids
Karleen, Conrad I.	Minneapolis
Karlen, Markle	Minneapolis
£ Karlowski, Thomas R.	Rochester
£ Karlstad, Gary L.	Rochester
Karn, Jacob F.	Ortonville
Karnes, William E.	Rochester
† Karrow, John W.	Rochester
Karon, Everett H.	St. Paul

KARON-KOTCHEVAR

	Karon, Irvine M.	St. Paul		Kiolbasa, Edward B.	Stillwater
†	Kasper, Eugene M.	St. Paul	£	Kipfer, Robert E.	Rochester
	Kasper, Robert E.	Minneapolis	†	Kippen, Neil	Breckenridge
†	Kath, Reinhard H.	Merrifield		Kirby, Thomas J., Jr.	Rochester
	Katkov, Harold	Minneapolis		Kirklin, John W.	Birmingham, AL
	Katz, Beni	Minneapolis	£	Kishel, Gene F.	Rochester
	Katz, Harry I.	Minneapolis		Kiser, Joseph C.	Minneapolis
	Katz, Louis J.	Long Beach, CA		Kitzberger, Peter J.	New Ulm
	Kaufman, Edward J.	Appleton		Kjellsen, Douglas L.	Minneapolis
	Kaye, Dale R.	Minneapolis		Klass, Donald W.	Rochester
	Kazmier, Francis J.	Rochester		Klassen, Arthur C.	Minneapolis
	Kearney, R. Wynn	Mankato		KLC—Mikusiak, George M.	Eveleth
	Keenan, Thomas P.	St. Paul		Klefstad, Lloyd H.	Greenbush
	Kegel, James F.	Minneapolis	†	Klein, Harry	Duluth
	Keil, Marcus A.	Albert Lea	£	Klein, Robert	Rochester
†	Keith, Haddow M.	Rochester		Kleinkauf, Thomas P.	Hutchinson
†	Keith, Norman M.	Rochester		Kleinsasser, Warren L.	St. Paul
	Keith, Paul J.	Milaca		Kleven, Lowell H.	Minneapolis
	Keithahn, Elmer E.	Sleepy Eye		Kluge, John W.	St. Paul
	Kelalis, Panayotis P.	Rochester		Knapp, James F.	Detroit Lakes
†	Kelby, Gjert M.	Minneapolis		Knapp, Miland E.	Minneapolis
	Keller, Curtis	White Bear Lake	†	Knight, Ralph T.	Minneapolis
	Kelly, Charles F.	Minneapolis	†	Knight, Ray R.	Minneapolis
	Kelley, Roger E.	Crosby		Knip, Robert J.	Ortonville
	Kelly, Edward H.	St. Paul		Knipp, William J.	Brainerd
	Kelly, Helen M.	West St. Paul		Knobloch, William H.	Minneapolis
	Kelly, James H.	St. Cloud		Knoche, Harvey A.	Gaylord
	Kelly, John C.	Minneapolis		Knoedler, John P.	Duluth
	Kelly, John F.	Cold Spring	†	Knoll, W. V.	Brainerd
	Kelly, John P.	Minneapolis		Knott, John W.	Forest Lake
£	Kelly, John T.	Minneapolis		Knowles, Richard A.	Minneapolis
	Kelly, Joseph R.	St. Paul		Knowles, Roy C.	St. Paul
	Kelly, Patrick J.	Rochester		Knowles, William D.	Mankato
	Kelly, Robert T.	Grand Rapids		Knudsen, Helen L.	Minneapolis
	Kelly, William D.	Minneapolis		Knutson, Gerhard E.	St. Paul
£	Kelman, Donald B.	Rochester		Knutson, Lewis A.	Spring Grove
†	Kelsey, Carleton G.	St. Paul		Knutson, Robert C.	St. Paul
	Kelsey, Chauncey M.	St. Paul		Kodres, Nina	St. Paul
†	Kemp, Alphonse F.	Mankato		Koelz, Thomas A.	St. Paul
	Kennedy, Byrl J.	Minneapolis		Koenig, Robert P.	St. Cloud
	Kennedy, Charles C.	Rochester		Kohlhase, Robert E.	Minneapolis
	Kennedy, Claude C.	Minneapolis		Kohls, Gary G.	Milaca
†	Kennedy, George L.	Faribault		Kolars, Charles P.	Minneapolis
	Kennel, Arthur J.	Rochester	†	Kolars, James J.	Faribault
	Kenyon, Thomas J.	St. Paul	†	Koller, Hermann M.	Minneapolis
£	Kepfer, Percy D.	Rochester		Koller, Robert L.	Minneapolis
†	Kernohan, James W.	Rochester	#	Kollmorgen, Rodger C.	West Point, NY
	Kerr, Frederick W. L.	Rochester		Kolp, Berton A.	Glenwood
†	Kesting, Herman	St. Paul	£	Kondo, Kiyotaro	Rochester
	Ketola, Launo E.	Glencoe		Konicek, Robert G.	Rochester
	Kevern, Jay L.	Henning		Kooda, Jennings C.	Morris
£	Key, Samuel N., III	San Francisco, CA	*	Koons, William R.	Mahnomen
	Keyes, Robert W.	Pipestone		Koontz, Peter S.	Minneapolis
	Khorsand, Darius	Minneapolis		Koop, Severin H., Jr.	St. Cloud
	Kieffer, Stephen A.	Minneapolis		Koos, Gerald W.	Minneapolis
	Kiely, Joseph M.	Rochester	£	Koppers, Lawrence E.	Rochester
	Kierland, Robert R.	Rochester	£	Koretzky, Emil	Rochester
	Kiesler, Frank	Grand Rapids		Korchik, John P.	Minneapolis
†	Kilbride, Edwin A.	Worthington		Korda, Henry A.	Pelican Rapids
	Kilen, Mark B.	Duluth		Koropchak, Nikolai	Minneapolis
	Kim, Kyoung	Worthington		Kostick, Joseph	Rochester
	Kim, Suck Wong	Minneapolis	¶	Kortz, Louise S.	Rochester
	Kim, Mark K.	St. Paul		Kosiak, Michael	St. Paul
	Kimmel, George C.	Minneapolis		Kosiak, William	St. Paul
	Kimmel, George E.	Rochester		Koskela, L. E.	Moose Lake
	Kincaid, Owings W.	Rochester		Kostich, Nikola D.	Minneapolis
	Kind, Allan C.	Minneapolis		Kostick, Joseph	Rochester
†	King, Frances W.	Minnetonka	†	Kostick, William R.	Fertile
	Kinkade, Byron R.	Ada	†	Kotchevar, Frank R.	Sun City, CA
	Kinney, William N.	Anoka			

KOTTKE-LAWLER

	Kottke, Frederic J.	Minneapolis
	Kotval, Russell J.	Pipestone
†	Koucky, Rudolph W.	Sagle, ID
	Kovack, Freeman D.	Minneapolis
†	Kovacs, J. Curtis	St. Paul
	Koza, Donald W.	St. Paul
	Kozak, Michael J.	Minneapolis
	Kozel, William J.	Morris
	Kraemer, George N.	Fairmont
	Krafft, Walter E.	Minneapolis
	Kragh, Lyle V.	Minneapolis
	Kramer, Daniel W.	Minneapolis
	Kramer, James D.	St. Paul
	Krasnow, Brian M.	Minneapolis
	Krause, Carl W.	Fairmont
	Kremen, Arnold J.	Minneapolis
	Kremer, Jerome L.	Montevideo
†	Kreuzer, Titus C.	New Brighton
	Krezowski, Thomas K.	St. Paul
	Kriel, Robert L.	St. Paul
	Krieser, Albert E.	Minneapolis
	Kreiser, Robert D.	Fergus Falls
£	Krohn, John R.	Rochester
	Kronenberg, Richard S.	Minneapolis
	Krueger, Bruce R.	Rochester
	Krupp, Neal E.	Rochester
	Kruzich, Stephen J.	St. Cloud
	Krystosek, Lee A.	Minneapolis

#	Kubista, Theodore P.	Duluth
†	Kucera, Frank J.	Hopkins
	Kucera, Stanley T.	Northfield
†	Kucera, William J.	Santa Barbara, CA
	Kuchner, Marvin E.	Red Wing
#	Kuge, Mark T.	San Francisco, CA
	Kugler, Alex A.	St. Paul
	Kuhlmann, Lawrence B.	Melrose
	Kuhlmann, Vernon G.	Alexandria
	Kulstad, Oscar S.	Dodge Center
	Kump, Warren L.	Minneapolis
	Kundel, Donald W.	Duluth
	Kuske, Albert W.	St. Paul
	Kuslich, Stephen	Burnsville
	Kusske, Bradley W.	St. Paul
	Kusske, Douglas R.	St. Paul
	Kussy, James C.	Little Falls
	Kusz, Clarence V.	Minneapolis
	Kuz, Eugene L.	Savage
	Kvale, James N.	Shakopee
	Kvale, John	Long Prairie
	Kvam, Lowell L.	St. Paul
	Kvamme, Brynjulv	Mabel
	Kvistberg, Gerald K.	St. Cloud
	Kwako, Jerome E.	Duluth
	Kyle, Robert A.	Rochester
	Kyllo, John E.	Minneapolis
	Kyllonen, Ronald R.	Edina

L

	L'Abbe, A. J. Philip	Duluth
	L'Heureux, Philippe R.	Minneapolis
	LaBree, John W.	Minneapolis
	LaBree, Robert H.	Duluth
	Lackore, Leonard K.	Willmar
	Lade, Roswith I.	St. Paul
	LaFave, James W.	St. Paul
	LaFond, Edward M.	St. Cloud
	Lagaard, Sheldon	Minneapolis
	Lai, Charles C. Y.	Minneapolis
	Laikola, Leslie A.	Adrian
†	Lajoie, John M.	Minneapolis
	Lake, Clifford F.	Rochester
	La Kosky, Randall	St. Paul
	Lamb, H. Douglas	Chattahoochie, FL
	Lampert, Ronald M.	St. Paul
	Lamusga, David J.	Minnetonka
£	Landmark, James D.	Rochester
£	Landmark, Sandra J. S.	Rochester
	Landsman, Gordon S.	Minneapolis
	Lane, Jerald P.	Minneapolis
	Lane, Miles I.	White Bear Lake
£	Lang, Allen G.	Rochester
	Lang, Leonard A.	Minneapolis
	Langer, Leonard O., Jr.	Minneapolis
	Langseth, Rodney N.	Duluth
£	Lanier, Anne P.	Rochester
£	Lanier, James F.	Rochester
	Lannin, Bernard G.	St. Paul
	Lannin, Donald R.	St. Paul
	Lannon, James B.	Minneapolis
†	Lapierre, Arthur P.	Minneapolis
	Larkin, John E.	St. Paul
	Larrabee, Walter F., Jr.	Willmar

	Larsen, Frank W.	Minneapolis
£	Larsen, Russell H.	Minneapolis
	Larson, Allen K.	Minneapolis
	Larson, Arthur K.	Minneapolis
	Larson, Donald Marvin	Duluth
	Larson, Donald Myren	Minneapolis
	Larson, Donald R.	Crosby
	Larson, Dorette W.	Fergus Falls
	Larson, Ernest J., Jr.	Minneapolis
	Larson, Eva Jane O.	St. Paul
	Larson, F. Wilmer	Minneapolis
	Larson, Gerald E.	Cambridge
	Larson, Jerrold V.	St. Paul
	Larson, Kenneth R.	Moose Lake
	Larson, Lawrence M.	Minneapolis
	Larson, Leighton W.	Waconia
†	Larson, Leroy J.	Bagley
†	Larson, Milo H.	St. Peter
	Larson, Oliver E. H.	Zumbrota
	Larson, Richard E.	Minneapolis
	Larson, Roger C.	Minneapolis
	Larson, Stephen L.	Edina
	Larson, Theodore G.	Brainerd
	Larson, Wyllis G.	Minneapolis
	Larter, Roland R.	Hallock
†	Laszewski, Franz von Zelberschwecht	St. Paul
	Latterell, Kenneth E.	Duluth
	Latts, Elliot M.	Minneapolis
	Lauritzen, Herbert	Minneapolis
	Lavender, Dick R.	St. Louis Park
£	Laventman, Jaime	Rochester
†	LaVake, Rae T.	Minneapolis
	Law, Harrison E.	Virginia
	Lawler, Kevin M.	St. Paul

LAWRENCE-LOKEN

	Lawrence, Van S.	Minneapolis		Levitt, George X.	St. Paul
	Lawrow, John W.	Minneapolis		Levitt, Seymour H.	Minneapolis
	Laws, Edward R., Jr.	Rochester		Levy, Michael	Minneapolis
	Lawson, Warren R.	Minneapolis		Lewis, Charles W.	Henning
	Lawton, James J., Jr.	Minneapolis		Lewis, F. Bruce	Minneapolis
	Laxdal, Stefan D.	Minneapolis		Lewis, Glenn M., Jr.	Minneapolis
	Layman, Thomas E.	St. Paul		Lewis, Joyce S., Jr.	Minneapolis
	Layer, James M.	Minneapolis		Lick Louis C.	Minneapolis
£	Lazar, Anthony S.	Rochester		Lick, William J.	St. Paul
†	Leach, Clifford G.	St. Paul		Liebhaver, Henia F.	Anoka
	Leach, Thomas C.	Hudson, WI		Lien, Richard J.	St. Paul
	Leaf, Donn	Red Wing	†	Lightbourn, Edgar L.	Hastings
	Leahy, Dennis M.	St. Paul		Lilleberg, Norbert J.	St. Paul
	Leary, Frank J.	Rochester		Lillehei, James P.	Minneapolis
#	Leavelle, Dennis E.	Dartmouth, IL		Lillehei, Richard C.	Minneapolis
	Leavenworth, Richard O., Jr.	Minneapolis		Lillemoen, Roger D.	Minneapolis
†	Leck, Paul C.	Palm Desert, CA		Lillie, Andrew R.	St. Paul
	Lee, Gordon E.	Glenwood		Lillie, John C.	Rochester
†	Lee, Hubert W.	Brainerd		Lima, Ludvig R.	Montevideo
	Lee, Ju Hao	Minneapolis		Limbeck, Donald A.	Minneapolis
	Lee, Norman J.	Tracy		Lin, Hong-Chien	Natatoon, IL
	Lee, Raymond A.	Rochester	¶	Lind, Judy E.	Rochester
	Lee, Robert E.	Rochester		Lindahl, Merlyn J.	Sherburn
	Lee, William C.	Hibbing		Lindall, Arnold W., Jr.	Minneapolis
	Leek, Joseph H.	Duluth		Lindberg, Evan F.	Minneapolis
	Leenhuis, Andrew J.	Minneapolis		Lindberg, Vernon L.	Minneapolis
	Lees, David C.	Minneapolis		Lindberg, Winston R.	Minneapolis
	Lees, Jack R.	St. Paul		Lindblom, Alton E.	North Mankato
	Lehman, Donald S.	St. Paul		Lindblom, Maurice L.	Minneapolis
	Lehmann, James D.	Waconia		Lindeland, Arthur T.	Minneapolis
	Lehrer, Alfred J., Jr.	Montgomery		Lindell, Robert E.	St. Paul
	Leick, Richard M.	St. Paul		Lindeman, Raymond J.	Paynesville
	Leider, Lloyd L.	St. Paul		Lindemann, Charles E.	Minneapolis
	Leiferman, Robert J.	Minneapolis		Linderholm, Bruce E.	Minneapolis
	Leighton, John S.	Minneapolis		Lindgren, Russell C.	Minneapolis
	Leih, George G.	Virginia		Lindquist, Dale C.	Lindstrom
	Leino, Walter B., Jr.	Ely		Lindquist, Max F.	South St. Paul
£	Leinonen, Wendla E.	Anoka		Lindsay, Malcolm I., Jr.	Rochester
†	Leist, Frederick D.	Rochester		Lindseth, Esten	Excelsior
	Leitch, Archibald	South St. Paul		Linnell, Leonard S.	Duluth
	Leitch, Cecil	Litchfield		Linner, John H.	Minneapolis
	Lelwica, Thaddeus J.	Staples		Linner, Paul W.	Minneapolis
†	Lenander, Melvin E. L.	St. Peter	#	Lippman, Harry H.	San Diego, CA
	Lenarz, Albert J.	St. Cloud		Lippman, Elmer W., Jr.	Mankato
	Lenz, Bernard W.	Minneapolis		Lipschultz, Martin L.	Minneapolis
	Lenz, Joseph R.	Morton		Lipschultz, Oscar	Minneapolis
	Lenz, Oa	Minneapolis	*	Litin, Edward M.	Hopkins
	Leonard, Paul F.	Rochester	†	Litkewitsch, Helene	St. Paul
	Leonard, Samuel	Minneapolis		Litman, Abraham B.	Minneapolis
	Leonard, Stanley A.	St. Paul	†	Litman, Samuel N.	Duluth
	Leonardson, Peter Y.	Silver Bay		Litman, Thomas	Minneapolis
†	Leopard, Brand A.	Brownsville, TX	£	Little, John R.	Rochester
	Leppink, Harold B.	Two Harbors		Litzow, Thaddeus J.	Rochester
	Leppo, N. Erkki A.	Duluth		Lobell, Michael	St. Paul
	Lerdahl, Kenneth	St. Paul		Lober, Paul H.	Minneapolis
	Lerner, A. Ross	Minneapolis		Locke, Murray S.	Minneapolis
	Lerner, Irving J.	St. Paul	£	Lockwood, Reed R.	Rochester
	Leslie, Loren R.	Minneapolis		Loeb, George L.	St. Cloud
	Leslie, W. Robert	Minneapolis		Loes, Louis A.	St. Cloud
	Lessard, Richard J.	St. Paul	§	Loes, Peter L.	Minneapolis
	Lester, John W.	Mapleton		Lofgren, Eric P.	Rochester
	Lester, Malcolm J., Jr.	Truman		Lofgren, Karl A.	Rochester
	Lester, Theodore H.	Minneapolis		Lofness, Stanley V.	Minneapolis
	Letson, Robert D.	Minneapolis		Lofstrom, Dennis E.	Brainerd
†	Leven, N. Logan	St. Paul		Logan, George B.	Rochester
	Leverenz, Carleton W.	St. Paul	£	Logan, William S.	Rochester
	Levine, Howard M.	Minneapolis		Lohmann, John G.	Pipestone
	Levine, Norman D.	Minneapolis		Loken, Merle K.	Minneapolis
	Levitan, Leonard H.	St. Paul		Loken, Selmer M.	St. Paul
			†	Loken, Theodore	Ada

LOMMEN-McLEAD

Lommen, Morris	Austin
Lommen, Peter A., Jr.	Austin
London, Nathaniel J.	Minneapolis
Long, Donlin M.	Minneapolis
Longfellow, Helen W.	Brainerd
Lonstein, John E.	Minneapolis
Loomis, George L.	Winona
£ Looney, Timothy	Minneapolis
Lorentzen, Ernest S.	Detroit Lakes
Lott, Frederick H.	Minneapolis
† Love, J. Grafton	Rochester
Love, Thomas A.	St. Paul
† Lovett, Beatrice R.	Minnetonka
Lowe, Alexander D.	South St. Paul
Lowe, Douglass A.	Minneapolis
† Lowe, Thomas A.	South St. Paul
Lowry, Jeanette K.	Minneapolis
Lowry, Paul T.	Minneapolis
Lu, Cheng-en	Fergus Falls
Lu, Jennie W. G.	Fergus Falls
Luby, Thomas H.	St. Cloud
Lucas, Alexander R.	Rochester
£ Lucas, Charles T.	Rochester
Luckey, William T.	Minneapolis
Ludes, Bernard F.	Rochester
Lueck, Wallace W.	Minneapolis
Lueders, James H.	Evansville
Lufkin, Murray W.	St. Paul
† Lufkin, Nathaniel H.	Minneapolis
Luh, Edwin F.	Fergus Falls
Lukinac, Charles J.	Minneapolis
Lukk, Olaf	Prior Lake
Lund, George W.	Minneapolis
Lund, J. Benjamin	Mankato

Lund, Nancy R.	Minneapolis
£ Lund, Richard E.	Rochester
Lund, Richard R.	Minneapolis
† Lund, Werner J.	Staples
Lundberg, Kay R.	Duluth
Lundberg, William I.	Duluth
Lundblad, Rodger R.	Minneapolis
Lundblad, Stanley W.	Minneapolis
Lundborg, Gary T.	Bemidji
§ Lunde, Paul A.	Minneapolis
† Lundeberg, Karl R.	Minneapolis
Lundell, Carl L.	Granite Falls
† Lundholm, Arthur M.	Princeton
Lundquist, Charles B.	Minneapolis
Lundquist, Curt W.	Owatonna
Lundquist, Virgil J.	Minneapolis
Lundsten, Leslie C.	Bemidji
Lunseth, John B.	St. Paul
Lunzer, Richard G.	St. Paul
£ Luthra, Harvinder S.	Rochester
Lutter, Lowell D.	St. Paul
Lynch, Francis W.	St. Paul
Lynch, Michael F.	Minneapolis
Lynch, Raymond P.	St. Paul
Lynch, Richard P.	St. Paul
† Lynde, Orrin G.	Los Gatos, CA
Lynn, Hugh B.	Rochester
Lyon, Fred A.	Minneapolis
Lyon, John D.	Hopkins
Lyon, Larry E.	Luverne
Lyons, John R.	St. Cloud
Lysne, Richard B.	Minneapolis
Lysyj, Anatol	Minneapolis
Lyzenga, Anton G.	Minneapolis

M

McAfee, David K.	Willmar
McBean, James B.	Rochester
McBride, Alexander M.	Mankato
McBride, John W.	St. Paul
McCafferty, Charles	St. Paul
McCaffrey, F. John	Minneapolis
McCain, Donovan L.	St. Paul
McCampbell, Malcolm D.	Minneapolis
McCannel, Malcolm A.	Minneapolis
McCarten, Francis M.	Stillwater
McCarthy, Austin M.	Willmar
McCarthy, Charles J.	St. Paul
McCarthy, Donald	Minneapolis
McClellan, Robert J.	St. Paul
McClelland, John G.	Virginia
McCloud, C. Naumann	St. Paul
McCollister, Robert J.	Minneapolis
McConahay, William M., Jr.	Rochester
McConahay, William N. III	Rochester
McCormack, Lawrence R.	Rochester
McCormick, Donald P.	Minneapolis
McCoy, Stephen H.	Rochester
McCullough, Jeffery J.	St. Paul
McDaniel, Orianna	Hopkins
McDaniel, Samuel P.	Lakeville
McDougall, John C.	Rochester
McDowell, John P.	San Diego, CA
McDuffie, Richard W. Jr.	Ft. Sill OK
McElfresh, Edward C.	Minneapolis
McEllistrem, Edward J.	St. Paul

McEllistrem, Gerald D.	St. Paul
McEnaney, James E.	Owatonna
McEwan, Alexander	St. Paul
† McFarland, Arthur H.	Minneapolis
† McGandy, Robert F.	Minneapolis
# McGee, Hugh E., Jr.	Fort Lee, VA
McGill, Douglas B.	Rochester
McGovern, Lawrence O.	Minneapolis
McGroarty, Brian J.	St. Paul
£ McGuffin, Thomas V., II	Rochester
McHutchison, Samuel K.	North St. Paul
McIlrath, Donald C.	Rochester
† McNerny, Maurice W.	Minneapolis
† McIntyre, John A.	Owatonna
† McKelvey, John L.	St. Paul
McKelvey, John M.	Minneapolis
McKenna, Charles H.	Rochester
McKenna, James L.	Minneapolis
McKenna, John J.	Virginia
† McKenna, Jay K.	LaJolla, CA
McKenna, Maurice J.	Grand Rapids
McKenzie, Charles H.	Minneapolis
McKenzie, Eva E.	St. Paul
McKhann, Charles F.	Minneapolis
McKinlay, Gordon L.	Minneapolis
McKinley, C. Richard	Minneapolis
† McKinney, Frank S.	Minneapolis
† McLane, William O.	Brainerd
McLaughlin, Byron H.	Minneapolis
McLead, John A.	St. Paul

	McMahon, John E.	Minneapolis	£	Marik, Francis	Rochester
£	McMullan, Mart	Rochester		Mark, Aaron L.	Minneapolis
	McNamara, John P.	Rice		Mark, Merle S.	Minneapolis
	McNeill, John A.	Minneapolis		Mark, Peter M.	Minneapolis
	McNeil, Maurice R.	Glencoe		Marking, George H.	Minneapolis
	McNeil, John A.	St. Paul		Markland, Colin	Minneapolis
†	McNutt, John R.	Duluth		Markovitz, Jack M.	Minneapolis
	McParland, Felix A., Jr.	Minneapolis	£	Marmer, Robert H.	Rochester
	McQuoid, David W.	Excelsior		Marshall, Clark M.	Crosby
¶	McShane, Sister M. Quentin	Rochester	£	Marsiglia, Juan C.	Rochester
£	MacCarty, Collin S.	Rochester		Marso, John L.	Mankato
£	MacCarty, Robert L.	Rochester		Marta, John B.	St. Paul
£	MacCarty, William C., III	Rochester		Marte, Egon	Minneapolis
	MacCornack, Robert L., Jr.	Minneapolis		Martens, Theodore G.	Rochester
†	MacDade, Albert D. W.	Rochester	£	Martinbeau, Pierre	Rochester
#	MacDonald, Charles J.	Portsmouth, VA		Martin, Doreen A.	Pepin, W.
†	MacDonald, Daniel A.	Minneapolis		Martin, Dwight L.	St. Paul
	MacDonald, Roger A.	Grand Marais		Martin, Frank E.	Minneapolis
†	MacDonald, Vance D.	Rochester		Martin, Frederick F.	Bagley
	MacGibbon, James D.	Minneapolis		Martin, George B.	Thief River Falls
	MacKinnon, Donald C.	Minneapolis		Martin, George R.	Minneapolis
†	Macklin, William E., Jr.	Litchfield		Martin, Gordon M.	Rochester
†	MacLean, Alexander R.	Rochester		Martin, Harold R.	Rochester
	MacMillan, David G.	St. Paul	¶	Martin, James E.	Rochester
†	MacRae, Gordon C.	Duluth		Martin, Maurice J.	Rochester
†	Mach, Frank B.	Minneapolis	£	Martin, Raymond A.	Rochester
	Mach, John R.	Minneapolis		Martin, Webster C.	Duluth
	Mach, Ralph F.	Pine City	*	Martinson, Carl J.	Wayzata
	Macheledt, Neil L.	Anoka		Martinson, Elmer J.	Wayzata
†	Macklin, William E.	Litchfield		Martinson, Raymond M.	Virginia
	Mackoff, Samuel	Phoenix, AZ	£	Maruchi, Nobuhiro	Rochester
	Madireddi, Sivarama K.	Osseo	£	Marta, Toshihiko	Rochester
	Madland, Robert S.	St. Paul		Marvin, Joseph E.	Brainerd
	Madsen, Donald O.	Minneapolis		Maryland, Daniel L.	Duluth
	Maeder, Edward C.	Minneapolis		Maslansky, Robert A.	Minneapolis
	Maeder, Edward C., Jr.	Minneapolis		Mason, Bruce D.	Rochester
†	Magath, Thomas B.	Rochester		Massee, Joseph S.	Minneapolis
	Magee, Timothy M.	Minneapolis	£	Masserman, Richard L.	Rochester
	Magid, Gail A.	Santa Cruz, CA	*†	Masson, Duncan M.	Rochester
*†	Magney, Fredolph H.	Duluth	†	Masson, James C.	Rochester
	Magnuson, Raymond C.	Cambridge		Masson, James K.	Rochester
	Magtibay, Meynardo B.	Tyler		Mast, Frederic L.	Chisholm
	Mahan, Charles S.	Minneapolis		Mastbaum, Leonard T.	Minneapolis
	Maher, Frank T.	Rochester		Mateo, Guillermo	St. Paul
	Mahle, Donald G.	Wabasha		Mathers, John E.	Duluth
	Mahmud, Cholid	Minneapolis		Mathews, Wallace E.	Mankato
£	Maish, George O., Jr.	Rochester	†	Mathieson, Don R.	Rochester
	Maitland, Edwin T.	Willmar		Mathison, Larry A.	Fergus Falls
£	Malagelada, Juan R.	Rochester	£	Mathison, Robert D.	Rochester
	Malek, Reza S.	Rochester		Mathog, Robert H.	Minneapolis
	Malerich, J. Anthony	Cottage Grove	£	Matlak, Michael E.	Rochester
	Malkasian, George D.	Rochester		Matson, Roland W.	Spring Valley
	Malmquist, Carl P.	Minneapolis		Matthews, John A. G.	Minneapolis
	Malone, Patrick M.	Willmar		Mattson, Albert D.	Willmar
£	Maloney, James D.	Rochester		Mattson, Donald S.	Willmar
	Mandel, Sheldon L.	Minneapolis		Mattson, Roger A.	Minneapolis
£	Manesis, John G.	Rochester		Matus, Richard N.	St. Paul
	Manick, Kenneth P.	Minneapolis		Maunder, John B.	Minneapolis
	Mankey, James C.	Minneapolis		Maus, Donald J.	Monticello
	Mankin, Harold T.	Rochester		Maus, Philip W.	Dawson
	Manlove, Charles H., Jr.	St. Paul	†	Maxeiner, Stanley R.	Minneapolis
	Mann, George A.	Minneapolis		Maxeiner, S. R., Jr.	Minneapolis
	Manoles, Elias N.	Minneapolis		Maxwell, Robert E.	Minneapolis
	Manolis, Deane C.	Minneapolis		May, Horst G.	Duluth
	Marcia, Alfred	Anoka		May, Robert B.	St. Cloud
	Marciniak, Thomas A.	Rochester		Mayberg, Donald M.	Minneapolis
	Marcoux, J. Paul	Rochester		Mayne, John G.	Rochester
	Marcus, Walter M.	Rochester		Mazzitello, William F.	St. Paul
#	Marion, Dennis F.	Wright AFB, OH			

MEANY-MORK

Meany, Thomas J.	Minneapolis	Miller, Roland D.	Rochester
Mears, Burtis J.	St. Paul	Miller, Ross H.	Rochester
Mears, Thomas V.	Minneapolis	Miller, W. Eugene	Rochester
Mecklenburg, Fred E.	Minneapolis	Miller, William P.	Minneapolis
Medelman, John P.	St. Paul	Miller, Winston R.	St. Paul
Medina, Ambrosio M., Jr.	Wayzata	Miller, Zondal R.	St. Paul
Meeker, Henry C.	Minneapolis	Millett, D. Keith	Minneapolis
Meekin, Patrick C.	Minneapolis	Millikan, Clark H.	Rochester
Meinert, Albert E.	Winona	Mills, John L.	Winnebago
Meinert, John K.	Willmar	Mills, Stephen D.	Rochester
Melancon, Joseph F.	St. Paul	Milnar, Frank J.	St. Paul
Melashenko, Kenneth W.	Karlstad	Milroy, Thomas W.	Minneapolis
Melich, Paz C.	St. Paul	Minder, John G.	Minneapolis
Melichar, Paul J.	Minneapolis	Mindrum, Gerald G.	Minneapolis
Meller, Maurice	Brainerd	Minge, Raymond K.	Worthington
Meller, Robert L.	Minneapolis	Minsky, Armen A.	Minneapolis
Mendelson, Bryan C.	Rochester	Mintalar, Jose M.	Winsted
Mendesh, Anthony N.	Duluth	Mishek, Charles J.	St. Paul
Mendiola, Ramon P., Jr.	Waconia	Mitby, Irvin L.	Minneapolis
Menefee, Edward C.	Albert Lea	Mitchell, Berton D.	Minneapolis
Mennis, William I.	Staples	† Mitchell, Edward C.	College Place, WA
Mensheha, Nicholas M.	Minneapolis	Mitchell, George S.	St. Paul
Mercil, C. B.	Mahnomen	# Mitchell, John C., III	Travis AFB, CA
Meredith, Donald C.	Mankato	Mitchell, Mancel T.	Minneapolis
Merner, Thomas B.	Faribault	Mixer, Harry W.	Minneapolis
Merrick, Charlotte T.	St. Paul	Mlinar, Joseph P.	Austin
Merrick, Robert L.	St. Paul	Mock, Charles J.	Virginia
Merrick, William G.	Duluth	Moe, John H.	Minneapolis
Merrill, Daniel C.	Minneapolis	† Moe, W. Wyatt	Minneapolis
Merrill, Robert	Des Moines, IA	Moehn, John T.	Minneapolis
Merritt, Wallace A.	Rochester	† Moen, Johannes K.	Minneapolis
Mersy, David J.	Red Lake Falls	† Moersch, Frederick P.	Fort Lauderdale, FL
Messenger, Michael A.	St. Paul	† Moersch, Herman J.	Rochester
Metcalf, Norman	Princeton	£ Mokri, Bahram	Rochester
Metter, Earl J.	Rochester	Moghaddam, Alaeddin	Minneapolis
Metz, Donald D.	Minneapolis	† Molander, Herbert A.	North St. Paul
Meyer, Alvin J.	Minneapolis	Molenaar, Robert E.	Cannon Falls
Meyer, Frederick C.	Kenyon	Molina, J. Ernesto	St. Paul
Meyer, James J.	Rochester	£ Molitor, Mike	Madelia
Meyer, Howard J.	Duluth	Moller, Julie C.	Duluth
Meyer, Paul F.	Faribault	Moller, Jurgen	West St. Paul
Meyer, Richard H.	Faribault	Molnar, George D.	Rochester
Meyer, Robert P.	Faribault	Monahan, Robert H.	St. Paul
Michaelis, Dorothy L.	Duluth	Mongé, James J.	Duluth
Michel, Henry H.	Minneapolis	Monserud, Nels O.	Cloquet
Michels, Roger P.	Willmar	£ Monkman, George R.	Rochester
Michelson, Henry E.	Minneapolis	Monson, Einer M.	Minneapolis
Michienzi, Leonard J.	St. Paul	Monson, Leonard J.	Canby
Mickelsen, Emma F. (Fronk)	Holmes Beach, FL	Monson, Paul S.	Mound
Mickelson, John C.	Los Angeles, CA	Monson, Warren A.	Minneapolis
Midboe, Gilbert T.	Forest Lake	Montaniel, Necito L.	Crookston
Middlebrook, John E.	Minneapolis	Montgomery, Guy E.	Park Rapids
Midthune, Andreen S.	Lake Park	† Montgomery, Hamilton	Rochester
Midyett, F. Allan	Memphis, TN	Moody, David L.	Minneapolis
Miettunen, John B.	Hibbing	Mooney, Robert D.	St. Paul
Mijares, Wilfredo S.	Fairmont	Moore, Burton A.	Rochester
Miks, George M.	Aurora	Moore, Gordon L., II	Rochester
Milhaupt, Emmett N.	Dunedin, FL	† Moore, Irvin H.	Eden Prairie
Miller, Albert G.	St. Paul	Moorhead, Marie	Minneapolis
Miller, Fletcher A.	St. Paul	Moos, Daniel J.	Minneapolis
Miller, H. Dawes	Minneapolis	Moral, Harvey M.	Minneapolis
Miller, Harry G.	Virginia	Moran, Paul T.	St. Cloud
Miller, Harold E.	Minneapolis	† Morehead, Dewey E.	Bodega Bay, CA
Miller, Herman	Austin	Moren, J. Adelaide	St. Paul
Miller, Hugo E.	Minneapolis	Morgan, Hugh O.	Amboy
Miller, J. Carleton	Minneapolis	£ Morgan, Timothy J.	Rochester
Miller, John H.	Rochester	Mori, Hideo	Grand Meadow
Miller, Kenneth	Apple Valley	# Morimoto, Allen M.	San Francisco, CA
Miller, Linda K.	Winona	Mork, A. Harold	Anoka

Mork, Frank E.	Anoka	Muller, Sigfrid A.	Rochester
Mork, Frank E., Jr.	Minneapolis	* Mulligan, Arthur M.	Brainerd
Mork, John N.	Worthington	Mullin, Gerald T., Jr.	Minneapolis
Morlock, Carl G.	Rochester	Mulrooney, John	Winona
£ Morrey, Bernard F.	Rochester	Mulvahill, John E.	Minneapolis
Morrison, Robert R.	Northwoods, ND	Mundahl, Harold R.	St. Paul
Morrow, George W., Jr.	Rochester	Munger, James E.	Duluth
† Morse, Morton P.	LeRoy	Munkittrick, Ronald C.	Minneapolis
Morse, Robert M.	Rochester	Munneke, Lyle	Clara City
Morse, Roger D.	LeRoy	Munson, Martin S.	Moose Lake
Mortenson, Howard O.	Menahga	Murn, Thomas G.	St. Cloud
† Mosby, Maurice E.	Long Prairie	Murphy, Dennis B.	Rochester
Moshfeghi, Mohammad, M.	Red Wing	Murphy, Jack T.	St. Paul
Moss, Nyel H.	Minneapolis	† Murphy, Joseph W.	Rochester
Mosser, Donn G.	Minneapolis	Murphy, Joseph E.	Marshall
Mossman, Philip L.	Minneapolis	Murphy, Michael E.	Litchfield
£ Motto, Joseph D.	Rochester	Murphy, Thomas R.	Stillwater
Moulton, Keith B.	St. James	Murray, Charles L.	Minneapolis
Mouritsen, Glenn J.	Fergus Falls	† Murray, Elisabeth M.	Minneapolis
Mowlem, Albert	St. Paul	Murray, Robert A.	Hibbing
Moyer, John B.	Duluth	Murray, Robert A., Jr.	St. Cloud
Moyer, Leonard B.	Minneapolis	Murthay, K. V. K.	St. Paul
Moyer, Richard R.	Hibbing	Murtaugh, Robert J.	St. Paul
£ Mroz, Christine T.	Rochester	Muschenheim, Frederick	Minneapolis
Muchow, Gene C.	Austin	Muske, Marvin M.	Minneapolis
Mueller, Donald R.	Grand Rapids	Mussey, Mary E.	Rochester
Mueller, Henry M.	St. Paul	† Musty, Nicholas J.	Minneapolis
Mueller, James M.	Minneapolis	Muus, John H.	Staples
Mueller, LeRoy E.	Hendricks	Myaya, Po	St. Paul
Mueller, Rudolph B.	Richmond	Myers, Jay A.	Minneapolis
Muesing, Mark A.	Brainerd	Myers, John W.	Canby
£ Muhm, John R.	Rochester	Myers, Theodore P.	Albert Lea
£ Mulcahy, John J.	Rochester	Myers, Thomas T., III	Duluth
Mulder, Donald W.	Rochester	Myers, Thomas T.	Rochester
Mulder, Richard D.	Ivanhoe	Myhre, James A.	Minneapolis
Mulford, Beatrice	St. Paul	Myhre, John H.	Fergus Falls
Mulholland, William M.	Minneapolis	Mylrea, Murray J.	Burnsville
Muller, A. Eugene	North St. Paul	† Myre, Clifford R.	Paynesville
Muller, John J.	Hibbing		

N

Nagobads, Ilgvars J.	Minneapolis	Neira, Edward H.	St. Paul
Nagobads, V. George	Minneapolis	Nelimark, Donald R.	Virginia
Najarian, John S.	Minneapolis	Nilsen, Laurence T.	Rochester
Nakajima, Shigenori	Rochester	Nelms, Charles R. Jr.	St. Paul
Nakamura, James Y.	Detroit Lakes	Nelson, Audery M.	Rochester
Nash, Eldore B.	Minneapolis	Nelson, Bernette G.	Ely
# Nathan, Fred F.	Ellsworth AFB, SD	£ Nelson, Bernice A.	New Brighton
Nathenson, Aaron L.	Minneapolis	† Nelson, C. Barton	Minneapolis
£ Nauman, James C.	Rochester	Nelson, Carleton A.	Minneapolis
Navratil, Donald R.	Glencoe	Nelson, Clayton E. J.	Albert Lea
† Neal, Joe M.	Minneapolis	£ Nelson, David J.	St. Paul
Neal, Robert R.	Minneapolis	£ Nelson, David W.	Minneapolis
Nealy, Donald E.	Adrian	Nelson, Delbert R.	St. Paul
Nealy, Timothy E.	Blooming Prairie	Nelson, Edward N.	Minneapolis
Neault, Roger W.	Rochester	Nelson, Evan L., Jr.	Minneapolis
Neel, Harry B.	Albert Lea	Nelson, Glen D.	Minneapolis
† Neel, H. Bryan, III	Rochester	Nelson, Glenn E.	Redwood Falls
Neel, Henry B.	Albert Lea	Nelson, Gunard A.	Minneapolis
Neff, Walter S.	Virginia	† Nelson, Harvey	Deerfield Beach, FL
Neher, Frederick J.	St. Paul	† Nelson, Henry E.	Crookston
Nehring, John D.	Chaska	Nelson, John W.	Duluth
Neils, Vernon E.	St. Cloud	Nelson, Lloyd S.	Minneapolis
£ Neinas, Frederick W.	Rochester	Nelson, Loren E.	St. Paul
		Nelson, Louis A.	St. Paul

NELSON-OLSON

Nelson, Luther A.	Rush City	Nilsen, John A.	Minneapolis
Nelson, Maxine O.	Minneapolis	£ Nimlos, Kenneth O.	St. Paul
Nelson, Maynard C.	Minneapolis	Nimlos, Lenore O.	St. Paul
Nelson, O. L. Norman	Minneapolis	£ Nisbet, William	Rochester
Nelson, Robert H.	Benson	Nisius, George F.	Duluth
£ Nelson, Robert P.	St. Paul	Nivatvongs, Santhat	Minneapolis
Nelson, Ronald J.	St. Paul	£ Niven, Robert G.	Rochester
Nelson, Roger L.	Rochester	Nisswandt, Albert L.	Duluth
Nelson, Ronald J.	St. Paul	Nixon, James B.	Crosby
Nelson, Roy A.	Fergus Falls	Nobrega, Fred T.	Rochester
Nelson, Wallace I.	Minneapolis	£ Nolan, Declan R.	Rochester
Nemanich, George J.	Minneapolis	Nolan, Robert K.	Minneapolis
Nerenberg, Sidney	Minneapolis	Nolen, William A.	Litchfield
Neshiem, Martin O.	Albert Lea	Nollet, Donald J.	Hibbing
Ness, Duane E.	Wadena	£ Noller, Kenneth L.	Rochester
Ness, Richard A.	Fergus Falls	Noran, Harold H.	Minneapolis
Nesse, Anton S.	Minneapolis	† Norberg, Carl E.	Los Altos, CA
Nesse, James A.	Austin	Norberg, William J.	Minneapolis
Nesset, David G.	Rochester	Nord, Robert E.	Minneapolis
Nesset, Lawren B.	Minneapolis	Nordberg, Robert J.	Little Falls
Nesset, William D.	Minneapolis	† Nordlie, Paul E.	Minneapolis
Nesvacil, Leon	St. Paul	Nordlund, Mildred E.	Carmichael, CA
Neumann, Roland F.	Minneapolis	Nordman, Willard F.	Mora
Neumeister, Charles A.	Minneapolis	Noren, George R.	Minneapolis
Neupert, Jerrol R.	Rochester	Norman, David D.	St. Paul
Neuwirth, Gerardo D.	Minneapolis	Norman, Franklin C.	Minneapolis
Newcomber, Albert D.	Rochester	Norman, Mark L., Jr.	Minneapolis
Niazi, Suad A.	Granite Falls	Normann, Stephen T.	Waseca
Nicholas, S. Scott, Jr.	Minneapolis	Norquist, Joseph L.	St. Paul
Nichols, Donald R.	Rochester	Norris, John C.	Mankato
Nichols, Robert T.	Minneapolis	Norval, Mildred A.	Minneapolis
Nichols, Thomas O.	St. Paul	Nuebel, Charles J.	Long Beach, CA
Nichols, Victoria R.	Rochester	† Nuessle, Walter G.	Springfield
Nicholson, Richard W.	Fergus Falls	Nuessle, William F.	Minneapolis
Nickerson, John R.	Faribault	Nussbaum, Daniel	St. Paul
Nickerson, Neil D.	Fairmont	Nydahl, Bruce C.	Minneapolis
Nicolette, Charles C.	Minneapolis	Nydahl, Malvin J.	Sun City, AZ
Niedringhaus, Robert D.	Rochester	*† Nye, Lillian L.	St. Paul
Nielsen, David J.	Minneapolis	Nygren, William T.	Braham
Nietfeld, Aloys B.	Sauk Centre	Nywall, Dean D.	Slayton
Nijensohn, Daniel E.	Rochester		
O			
O'Brien, Bruce J.	Minneapolis	Odland, Olin M.	Marshall
O'Brien, Charles P.	Rochester	£ Odyniec, Norman A.	Rochester
O'Brien, Gerald R.	Minneapolis	Oeljen, Siegfried C.	Waseca
O'Brien, John C.	St. Paul	Officer, Charles D.	Burnsville
O'Brien, Louis T.	Breckenridge	† Ogden, Warner	River Falls, WI
O'Brien, William A.	Minneapolis	§ Ogle, Richard G.	Lakeville
O'Byrne, Alvaro	Mankato	† Ohage, Justus	St. Paul
O'Connor, Michael K.	Rochester	† Ohmann, Ronald J.	Minneapolis
O'Donnell, James E.	Minneapolis	Ohr, D. K.	Mankato
O'Hanlon, William J.	Minneapolis	Olavs, Olga	Minneapolis
O'Kane, Thomas W.	St. Paul	Olds, George H.	New Richland
O'Keefe, James P.	St. Cloud	Olfelt, Paul C.	Minneapolis
O'Leary, John B.	Minneapolis	Olinger, John N.	St. Cloud
O'Malley, Valentine	St. Paul	Olivencia, Jose A.	Rochester
O'Neil, Bernerd L.	Minneapolis	Olivet, Ronald T.	Rochester
O'Neill, John C.	Duluth	† Olmanson, Edmund G.	St. Peter
O'Neill, Nial C.	St. Paul	Olmanson, M. Donald	St. Peter
O'Phelan, E. Harvey	Minneapolis	Olmanson, Vern C.	St. Peter
O'Reilly, Bernard E.	Sun City, AZ	Olsen, Arthur M.	Rochester
O'Rourke, William J.	Austin	† Olsen, E. George	Minnetonka
Obetz, Samuel W.	Rochester	Olsen, Jay R.	Minneapolis
Ockuly, Orville E.	St. Paul	Olsen, Ralph L.	St. Paul
Odland, Donald M.	Luverne	Olson, Albert J.	Owatonna
Odland, Mark E.	Detroit Lakes	Olson, Alton C.	Minneapolis

OLSON-PERLMAN

	Olson, Barbara F.	Minneapolis
	Olson, C. Kent	Minneapolis
	Olson, Carl J.	Minneapolis
	Olson, David E.	Worthington
	Olson, Detlof M.	Minneapolis
	Olson, Duane C.	Minneapolis
	Olson, Frances P.	Fergus Falls
	Olson, Gregory M.	Litchfield
	Olson, Grant E.	West Concord
	Olson, Hardin E.	Minneapolis
£	Olson, John D.	Rochester
	Olson, Lillian A.	Ah-Gwah-Ching
	Olson, Neal R.	Rochester
*†	Olson, Olof A.	Minneapolis
	Olson, Philip A.	Minneapolis
§	Olson, Richard A.	Minneapolis
	Olson, Richard E.	Chaska
	Olson, Richard T.	Virginia
	Olson, Robert A.	Minneapolis
	Olson, Robert E.	Minneapolis
	Olson, Robert T.	Canby
	Olson, Robert W.	Minneapolis
	Olson, Rolland A.	Wayzata
	Onofrio, Burton M.	Rochester
†	Onsgard, L. Kenneth	St. Petersburg, FL
	Opel, D. Douglas	Rochester
£	Opgrande, John D.	Rochester
	Opheim, Richard H.	Minneapolis
	Opitz, Joachim L.	Rochester
†	Oppegaard, C. L.	Scottsdale, AZ
	Oppen, E. Gerhard	Minneapolis

	Oppen, Melvin G.	Minnetonka
	Opsahl, Lawrence J.	Willmar
	Opstad, Earl T.	Minneapolis
	Orandi, Ahmad	Fergus Falls
	Orandi, Mehdi	Fergus Falls
	Orbuch, Martin W.	Minneapolis
£	Orford, Robert R.	Rochester
	Orkin, Milton	Minneapolis
	Orn, Duane L.	Minneapolis
	Orr, Burton A.	Faribault
	Orr, Ernest W.	St. Paul
	Osborne, Donald	Austin
	Osteraas, Grayson R.	St. Cloud
	Osekowsky, Henry J.	St. Paul
	Osmundson, Philip J.	Rochester
	Osteraas, Grayson R.	St. Cloud
	Osterberg, Kenneth A.	Minneapolis
†	Ostergaard, Erling	Elbow Lake
	Ostrov, Charles S.	Minneapolis
£	Otero, Angel L.	Rochester
	Ott, Eugene C.	Minneapolis
	Ouellette, Alfred J.	St. Paul
	Ourada, Anthony L.	Buffalo
	Overgaard, Peter H., Jr.	Lindstrom
	Owen, Charles A., Jr.	Rochester
	Owen, Richard R.	Minneapolis
	Owens, Ben P.	Hibbing
	Owens, Frederick M.	St. Paul
	Owens, William A.	Montevideo
#	Oxman, Herbert A.	San Antonio, TX

P

	Paal, Dwain J.	Minneapolis
	Paciotti, Vincent J.	Hibbing
†	Page, Raymond L.	St. Paul
	Paguyo, Nelson	So. St. Paul
£	Pairolero, Peter C.	Rochester
	Paisner, Hyman M.	Minneapolis
†	Palattao, Agustin D., Jr.	Waconia
	Palen, Benjamin J.	Scottsdale, AZ
	Palm, E. Theodore	Minneapolis
	Palm, Neil M.	St. Paul
†	Palmer, Clinton F.	Albert Lea
	Palmer, Harry A.	Blackduck
	Palumbo, Pasquale J.	Rochester
	Pangaloss Anastase	St. Paul
	Panning, Wayne P.	Marshall
£	Panum, Paul D.	Rochester
	Paparella, Michael M.	Minneapolis
	Papermaster, Theodore C.	St. Louis Park
	Papermaster, Theodore C.	Wayzata
†	Paradis, Gaston R.	Rochester
	Park, Joan M.	Rochester
	Park, Myung C.	St. Cloud
	Park, Wilford E.	Minneapolis
	Parker, Robert L.	Rochester
	Parker, Warren E.	Sebeka
	Parker, Wilbert H.	Chisholm
†	Parkhill, Edith M.	Rochester
	Parod, John D.	Minneapolis
	Parra, Samuel	Crookston
	Parrott, John C.	Minneapolis
£	Parry, Rodney R.	Rochester
	Parson, E. Irvine	Duluth
†	Parson, E. Lillian	Elbow Lake
	Parsons, R. A.	St. James

	Parsons, Ralph L.	Trimont
	Pasek, Antone W.	Cloquet
£	Passmore, James A.	Rochester
	Patch, Orien B.	Duluth
£	Patrick, Donald L.	Rochester
	Pattee, James J.	Minneapolis
	Patten, John C.	Austin
	Patterson, Hugh D.	Slayton
††	Patterson, Linda G.	Rochester
	Patterson, Paul G.	Minneapolis
	Paule, William J.	Minneapolis
	Paulson, Elmer C.	St. Paul
£	Paulson, Olaf B.	Rochester
	Paulson, Wallace J.	St. Paul
	Payne, Richard E.	Virginia
	Payne, W. Spencer	Rochester
	Peake, Janna Z.	St. Paul
	Pearson, Bror F.	Shakopee
†	Pearson, Fritz R.	St. Paul
	Pearson, Harris L.	Bagley
	Pearson, Malcolm M.	St. Paul
†	Pease, Gertrude L.	Rochester
†	Pedersen, Arthur H.	St. Paul
	Pedersen, Robert L.	Brainerd
	Peikert, Carl F.	Forest Lake
	Pelletier, Rene W.	St. Paul
	Peluso, Charles R.	Minneapolis
	Pelzl, Charles R.	Pine River
	Penk, Engward L.	Springfield
	Penn, George E.	Mankato
	Pennington, Mary	Minneapolis
	Peper, Martin C.	Minneapolis
	Perkins, Douglass E.	Alexandria
	Perlman, Everett C.	Minneapolis

PERLMAN-PUGH

Perlman, Herschel L.St. Louis Park
 Perrault, Jean F.Rochester
 Perry, Harold O.Rochester
 Perry, Michael C.Rochester
 Perry, John F., Jr.St. Paul
 Perry, Lawrence B.Rochester
 Person, Duane F.Virginia
 Pesonen, CliffordAustin
 Pesonen, Ralph E.Austin
 Peteler, Jennings, C. L.Minneapolis
 Peters, Gustavus A.Rochester
 Petersen, Byron D.Minneapolis
 Petersen, Deane A.Wayzata
 Petersen, Donald H.Willmar
 Petersen, Eugene G.Rochester
 Petersen, Glenn L.Minneapolis
 Petersen, KennethPortland, OR
 Petersen, Magnus C.Rochester
 Petersen, Robert T.St. Cloud
 Petersen, William E.Minneapolis
 Peterson, Alvin C.Mora
 Peterson, Charles A.Minneapolis
 Peterson, Charles R.Minneapolis
 Peterson, Donald H.St. Paul
 Peterson, Edward A.St. Paul
 Peterson, Edward N.Virginia
 Peterson, GarrySt. Paul
 Peterson, Hamlet A.Rochester
 Peterson, Harold O.Minneapolis
 Peterson, John A.Minneapolis
 Peterson, John H.Duluth
 Peterson, John O. H.Hastings
 Peterson, John R.Rushford
 Peterson, Kenneth A.Marshall
 Peterson, Kenneth H.Hutchinson
 Peterson, Kenneth M.Portland, OR
 Peterson, Lawrence P.Rochester
 Peterson, Lowell F. A.Rochester
 Peterson, Norman P.Duluth
 Peterson, Oliver H., Jr.Minneapolis
 Peterson, Palmer A.Minneapolis
 Peterson, Rodney H.Minneapolis
 Peterson, Roy A.Vesta
 Peterson, Roy L.White Bear Lake
 Peterson, Theodore A.Minneapolis
 Peterson, Willard C., Jr.Minneapolis
 Peterson, Willard E.Willmar
 Petit, Julien V.Minneapolis
 Petit, Leon J.Minneapolis
 Petitt, Robert M.Rochester
 Petraborg, Harvey T.Aitkin
 Pettersen, George R.Los Angeles
 Pettko, JosephWheaton
 Petty, Roy W.Rochester
 Pewters, John T.Minneapolis
 Peyla, Thomas L.Rochester
 Pafaffenbach, David D.Ft. Sam TX
 Pfohl, Richard A.Minneapolis
 Phares, Otto C.St. Cloud
 Phelps, Kenneth A.Palo Alto, CA
 Phelps, Robert D.Minneapolis
 Phibbs, Clifford M., Jr.Minneapolis
 Phillips, LeonardSt. Paul
 Philp, David R.Watertown
 Pien, Francis, D.Rochester
 Pierce, Robert B.Esterville, IA
 Pierre, Robert V.Rochester
 Pierson, Roy F.Slayton
 Pietan, Jerold H.Rochester
 Pilling, Loran F.Minneapolis

Pilney, Frank T.St. Paul
 Pincus, MitchellMinneapolis
 Pinell, Octavio C.Minneapolis
 Pinsonneault, W. A.Roseau
 Pistulka, Rolland D.Chaska
 Pitcher, Arlo L.St. James
 Pitzele, Charles E.St. Paul
 Pivac, Dragojla (Popovich)Milwaukee, WI
 Pizarro, Remi L.Minneapolis
 Plasha, Matthew K.Coon Rapids
 Plass, Herbert F. R.Minneapolis
 Pleissner, Karl W.Minneapolis
 Pliam, Michael B.Rochester
 Plimpton, Nathan C.Minneapolis
 Plotke, Harry L.St. Paul
 Plucker, Milton W.Worthington
 Pluth, James R.Rochester
 Plutnicki, Ronald S.Rochester
 Pogue, Charles G.Albert Lea
 Pohl, John F.Minneapolis
 Poisson, JacquesRochester
 Poland, Jerome D.Minneapolis
 Polesky, Herbert F.Minneapolis
 Poljack, Stuart JamesMinneapolis
 Poley, Brooks J.Minneapolis
 Pollak, KurtMinneapolis
 Pollard, William S.Duluth
 Polley, Howard F.Rochester
 Polman, Stanley E.Naha, Okinawa
 Pollock, Anthony J.Minneapolis
 Polski, Paul G.South St. Paul
 Polzak, James A.Roseville
 Pone, John J.Minneapolis
 Ponterio, James E.Shakopee
 Pool, T. LloydRochester
 Poole, James R.Wheaton
 Popadiuk, PeterMinneapolis
 Pope, David A.Janesville
 Popoff, Russel G.Graceville
 Popowich, John G.Minneapolis
 Poppe, Frederick H.Miami, FL
 Poppie, Robert W.Brainerd
 Port, Friedrich K.Rochester
 Post, Edmund A.St. Paul
 Poston, Lawrence M.Caledonia
 Potter, Robert B.Minneapolis
 Pougiales, Mary L.Rochester
 Powell, David F.Rochester
 Power, John E.Duluth
 Powers, Robert L.St. Paul
 Pratt, Fred J.Minneapolis
 Pratt, Joseph H., Jr.Rochester
 Prentice, James A.Rochester
 Prentice, Linda G.Rochester
 Prentice, Walter B.Oklahoma City, OK
 Prem, Konald A.Minneapolis
 Preston, Frank S., Jr.Minneapolis
 Price, William E.Minneapolis
 Prickman, William E.Minneapolis
 Priest, Robert E.Minneapolis
 Priestley, James T.Rochester
 Prlina, Issac M.Virginia
 Prokstfield, Jeffrey L.Minneapolis
 Proeschel, Ray K.Willmar
 Proshek, Lumir C.Minneapolis
 Proud, Harry S.St. Paul
 Provence, Cecil L.Waconia
 Pruitt, Raymond D.Rochester
 Pugh, David G.Sanibel Island, FL

PULIDO-RIPPLE

Pulido, Ernesto D.Fergus Falls
 Pumala, Erven E.Warren
 Purdie, James L.Forest Lake
 Purnell, Don C.Rochester

Purves, G. HarlandBuffalo
 Puumala, Barbara M.Cloquet
 Puumala, Reino H.Cloquet
 Puumala, Ricard R.Cloquet

Q

Quast, John E.St. Paul
 Quattlebaum, Frank W.St. Paul
 Quello, Robert O. B.Minneapolis

Quick, Cedric A.Minneapolis
 Quiggle, Arthur B.Minneapolis
 Quiroz, Salvador E.Rochester
 Quist, Henry W., Jr.Minneapolis

R

Raab, David E.Minneapolis
 Raaen, Olaf J.St. Paul
 Rabceovich, AnatoleSt. Paul
 Racer, Harley J.Minneapolis
 Radke, Robert L.Milan
 £ Radtke, Wallace E.Rochester
 Raetz, Sylvester J.Maple Lake
 Ragan, John R.Minneapolis
 £ Rahimi, AbbasRochester
 Raich, John J.Minneapolis
 Raile, Richard B.Minneapolis
 £ Raimundo, Hugo SaRochester
 Ralph, James R.St. Paul
 Ralston, Donald E.Rochester
 Ramirez-Lassepas, ManuelSt. Paul
 Ramlow, Ralph M.West St. Paul
 *† Ramsey, Walter R.St. Paul
 Randall, David A.Minneapolis
 £ Randall, PatriciaMinneapolis
 Randall, Philip S.Minneapolis
 Randall, Raymond V.Rochester
 Ranheim, Phillip J.Minneapolis
 Ransom, H. RobertSt. Cloud
 Ratelle, Alexander E.Minneapolis
 Raths, Otto N., Jr.St. Paul
 Rauenhurst, John M.St. Paul
 Ravits, Harold G.St. Paul
 £ Ravry, Mario J. R.Rochester
 Rayer, Anthony L.Babbitt
 Rayner, Ralph R.Red Wing
 Rea, Charles E.St. Paul
 Reardon, Andrew E.Duluth
 Recht, Thomas M.Minneapolis
 # Reckles, Lawrence N.Winter Park
 Redleaf, Paul D.St. Paul
 Reeber, ErickBagley
 Reece, Richard L.Minneapolis
 Reed, Henry H.Duluth
 Reed, John H., Jr.Minneapolis
 Reed, PaulVirginia
 Reed, Sheldon C.Minneapolis
 Reese, David F.Rochester
 Reff, Alan R.Crookston
 Regan, John J.Minneapolis
 Rehmann, Ronald E.Coon Rapids
 Reichel, Samuel M.Minneapolis
 *† Reichelderfer, Charles F.Staples
 Reichelt, Leland G.Wadena

£ Reick, Robert R.Rochester
 Reid, Howard C.Bemidji
 Reid, James W.South St. Paul
 Reif, Harold A.Minneapolis
 Reif, Robert W.White Bear Lake
 Reiley, Richard E.Minneapolis
 Reiners, Gary L.Cambridge
 Reinhardt, James H.Alexandria
 Reinhart, Richard O.Minneapolis
 Reisdorf, George E.Minneapolis
 Reiser, Milton P.Minneapolis
 Reitemeier, Richard J.Rochester
 ReMine, William H., Jr.Rochester
 Remole, William D.Minneapolis
 Resch, Joseph A.Minneapolis
 Restall, Charles J.Rochester
 Reul, Thomas W.Robbinsdale
 Reynolds, Dermot F.Hibbing
 # Reynolds, James C.Madison, WI
 Reynolds, James F.Minneapolis
 Rhodes, Clinton E.Minneapolis
 Rholl, Arnold O.Minneapolis
 Rice, Carl O.Minneapolis
 Rice, Edwin G.Minneapolis
 Rice, Fred A.Minneapolis
 † Rice, Hagbart G.Park Rapids
 Rice, William H.St. Cloud
 † Richards, William B.St. Cloud
 Richardson, Edward J.St. Paul
 Richardson, Robert J.Minneapolis
 † Richdorf, Lawrence F.Minneapolis
 Richter, David J.Virginia
 Richter, Paul H.Fergus Falls
 Rick, Paul F. W.St. Paul
 Rierison, Phillip A.Minneapolis
 Rieschl, Elizabeth K.Jordan
 Rifat, Baseem M.Clarkfield
 Rife, Charles C.Rochester
 Riggs, B. LawrenceRochester
 Riley, Fenwick C., Jr.Rochester
 Riley, John D.Minneapolis
 Rimas, Matthew J.Comfrey
 Ringhofer, LawrenceNew Ulm
 † Ringle, Otto F.Walker
 Rinkey, EugeneSt. Paul
 Riordan, Elsie M.Minneapolis
 † Ripple, Rudolph J.St. Paul
 Ripple, Rudolph J., Jr.Minneapolis

RISCH-SALTER

Risch, Ronald E.Minneapolis
 Risser, Alden F.Stewartville
 Ristic, MiodragCambridge
 Ritchie, Donald A.St. Cloud
 Ritt, Albert E.St. Paul
 Ritter, Donald G.Rochester
 Rivan, Robert J.Rochester
 Rivers, Thomas A.Rochester
 Rizer, Dean K.Minneapolis
 Roach, Charles A.St. Paul
 Roach, Donald E.St. Paul
 Robb, Edwin F.Minneapolis
 Roberts, Byron H.Minneapolis
 Roberts, George A.Austin
 Roberts, Lewis J.Minneapolis
 Roberts, Oliver W.Owatonna
 Robertson, Dennis M.Rochester
 Robertson, Paul A.Austin
 Robertson, Robert C.Rochester
 Robinson, Cortland O.Minneapolis
 Robinson, William W.Agana, Guam
 Robnik, Spencer L.Willmar
 Rock, William H.Anoka
 Rocknem, Robert E.Minneapolis
 Rockswold, GordonSt. Paul
 Rockwell, Curtiss V.Minneapolis
 Rockwood, Philo H.Fergus Falls
 Rodgers, Richard S.Minneapolis
 Rodning, Charles B.St. Paul
 Roehlke, Arthur B.Elk River
 Roemer, Henry J.Winona
 Rogers, Charles W.Winona
 Rogers, John R.Rochester
 Rogers, Roy S., IIIRochester
 Rogin, NortonMinneapolis
 Rogne, W. G.Spring Grove
 Roholt, ChristianMcIntosh
 Roholt, Hartvig B.Bemidji
 Rohrer, Christian A.Madison Lake
 Rohrmann, Charles A. Jr.Minneapolis
 Rolig, David H.West St. Paul
 Rollins, PatMinnetonka
 Rome, Howard P.Rochester
 Romero, Jose B.St. Paul
 Romness, Kenneth B.Mound
 Rooke, E. DouglasRochester
 Rorem, Joseph A.Appleton
 Rose, CordtAlbert Lea
 Rosenbaum, Alan H.Rochester
 Rosenbaum, David L.Minneapolis
 Rosendahl, Frederick G.Minneapolis
 Rosenfield, Abraham B.Minneapolis
 Rosenquist, Rudolph J.Minneapolis
 Rosenow, Edward C., IIIRochester
 Rosenow, John H.Minneapolis
 Rosenstein, Hanan J.Minneapolis
 Rosenthal, RobertSt. Paul
 Rosenwald, Reuben M.Anoka
 Rosevear, John W.Minneapolis

Ross, James V., Jr.Rochester
 Rossberg, Raymond A.Morris
 Rossen, Ralph X.Minneapolis
 Rotenberg, Robert J.Minneapolis
 Rotenberg, SamuelBeverly Hills, CA
 Roth, Albert H.Deer River
 Roth, Charles W.Red Wing
 Roth, Frederick D.Mankato
 * Roth, George C.St. Paul
 Rothnem, Morris S.Minneapolis
 Roust, Henry A.Montevideo
 Rovestad, Randolph A.Rochester
 Rovestad, Roger A.St. Cloud
 Rowe, Clarence J., Jr.St. Paul
 Rowe, Richard G.Duluth
 † Rowles, Everett C.Laguna Hills, CA
 Roy, Paul H. J.Quebec, Canada
 Roy, Philemon C.St. Paul
 Rozboom, Paul E.Mankato
 Rozycki, Anthony T.St. Cloud
 Rubin, ManlyMinneapolis
 Ruchie, Warren H.Willmar
 † Rucker, Charles W.Rochester
 Rucker, Thomas K.Minneapolis
 † Rucker, William H.Minneapolis
 † Rud, Norman E.Edina
 Rud, Paul D.Luverne
 Rudie, Peter S.Duluth
 Rudie, William D.Duluth
 £ Rue, David S.Rochester
 † Ruggles, George M.Forest Lake
 *† Ruhberg, George N.Santa Barbara, CA
 Ruhe, Albert H.Willmar
 Ruiz, ErnestMinneapolis
 Rukavina, John G.St. Paul
 † Rumpf, Carl W.Faribault
 Runquist, John M.Duluth
 Runquist, Richard K.Cambridge
 Rushay, Arthur J.White Bear Lake
 Rushton, Joseph G.Rochester
 † Russ, Homer H.Blue Earth
 £ Russ, Homer H., Jr.Rochester
 Russeth, Arthur N.Wayzata
 Rusten, Elmer M.Minneapolis
 Rusterholz, Alan P.St. Paul
 Ruth, Bradley R.Duluth
 Rutledge, John B.Detroit Lakes
 † Rutledge, Lloyd H.Detroit Lakes
 £ Ruzich, Russell S.Rochester
 Ryan, Edward A.Duluth
 † Ryan, John J.St. Paul
 Ryan, Joseph M.St. Paul
 Rydberg, John S.Minneapolis
 Ryding, VincentAmes, IA
 Rydland, Arne D.Minneapolis
 Rygh, Harold N.Atwater
 † Rynearson, Edward H.Rochester
 Rynda, Edwin R.New Prague
 Rysgaard, George N.Northfield

S

Sadd, MiltonWillmar
 Saffert, Cornelius A.New Ulm
 St. Cyr, Harry M.Minneapolis
 St. Cyr, Kenneth J.Robbinsdale
 Salassa, Robert M.Rochester
 Salchert, John J.Minneapolis

Salk, Richard J.Albany
 Saliterman, Bernard I.Minneapolis
 Saloum, Lucille M.Duluth
 Salovich, Edward L.Minneapolis
 Salovich, Elmer R.Minneapolis
 † Salter, Reginald A.Virginia

SALTER-SEABERG

	Salter, Wilson M.	Willmar		Schlorf, Richard A.	St. Cloud
£	Samara, David J.	Rochester		Schmid, John F.	Duluth
	Sanchez, Jose S.	West St. Paul	†	Schmidt, Hilmar R.	Winona
	Sand, Richard E.	St. Paul		Schmidt, Paul G.	Granite Falls
	Sandeen, Richard M.	Buffalo		Schmidt, Ruben F.	Alden
	Sander, Frank V., Jr.	Rochester		Schmidt, W. Robert	Minneapolis
	Sander, John L.	Red Wing		Schmidtke, Reinhardt L.	St. Paul
£	Sanders, Herbert F.	Rochester	†	Schmitt, S. C.	Fallbrook, CA
	Sanderson, David J.	Fergus Falls		Schmitt, Tim B.	Browerville
	Sanderson, David R.	Rochester		Schmitz, Anthony A.	Mankato
	Sandkamp, Virgil A.	South St. Paul		Schmitz, Everett J.	St. Cloud
	Sandok, Burton A.	Rochester		Schnabel, Norma B.	Crookston
	Sandt, Karl E.	Minneapolis		Schnabel, Robert F.	Crookston
†	Sanfilippo, Peter M.	Rochester		Schneck, Jack I.	Minneapolis
	Sanfilippo, Sylvester J.	Minneapolis		Schnell, Frederick S.	Litchfield
	Sanford, John B.	Duluth		Schochet, H. Laurence	St. Paul
	Sanford, Raymond A.	Mankato	£	Schoenberg, Bruce S.	Baltimore, MD
	Sargent, John H.	St. Paul		Schoenberger, P. B.	Perham
	Sartor, Richard	Minneapolis		Schoening, Herbert A.	Minneapolis
£	Satava, Richard M.	Rochester		Schoenwetter, William F.	Minneapolis
	Sather, Edgar L.	Fosston		Schoewe, Richard W.	St. Paul
	Sather, George A.	Fosston		Scholz, Donald A.	Rochester
	Sather, Richard N.	Fosston	†	Schons, Edward	Minnetonka Beach
	Sather, Russell O.	Crookston		Schossow, George W.	White Bear Lake
	Sathler, Paul A.	Jordan		Schottler, Jerry L.	Minneapolis
	Sauer, Jean C.	Fort Snelling		Schottler, Max E.	Minneapolis
	Sauer, Robert L.	Preston	£	Schotzke, Charles P.	Blue Earth
	Sauer, William G.	Rochester		Schotzko, John R.	Blue Earth
	Savett, Laurence A.	St. Paul		Schroeckenstein, Hugo F.	St. Paul
£	Savoy, Leonard B.	Rochester		Schroeder, Albert J.	Minneapolis
	Sawtell, Robert R.	Rochester		Schroeder, Glenn E.	Red Wing
	Sawyer, Glen T.	Minneapolis	£	Schroeder, James G.	Rochester
	Sax, Milton H.	Duluth	£	Schroeder, Stephen B.	Rochester
	Saxena, Krishna M.	St. Paul		Schroepfel, Roger O.	Tracy
	Saxera, Kusum	St. Paul	£	Schroeter, Arnold L.	Rochester
	Saxman, Gertrude E. O.	Ulen		Schulberg, Verne A.	Minneapolis
	Sayther, Keith D.	Minneapolis		Schulenberg, Robert N.	Red Wing
	Sborov, Abe M.	Minneapolis		Schultz, Alan K.	Minneapolis
£	Scallen, Edward S.	Rochester		Schultz, Alvin L.	Minneapolis
	Scallen, Raymond W.	Minneapolis		Schultz, J. Harold	Minneapolis
	Scanlan, Patrick J.	Minneapolis		Schultz, Paul E.	St. Paul
	Scanlan, Timothy M.	Melrose		Schultz, Peter J.	Minneapolis
	Scanlon, Hugh A.	Little Falls		Schultz, Robert J.	Minneapolis
	Scanlon, Paul W.	Rochester		Schulz, Jerome E.	Stillwater
	Schaar, Frances E.	Minneapolis		Schulz, Robert W.	Fairmont
†	Schade, Frederick L.	Santa Cruz, CA		Schulze, Thomas W. Jr.,	Austin, TX
†	Schaefer, Joseph F.	Sun City, AZ		Schulze, William M.	Minneapolis
†	Schaefer, Wesley G.	Minneapolis		Schumacher, John W.	Minneapolis
	Schafer, Charles F.	Winona	£	Schumacher, Robert V.	Minneapolis
	Schaffhausen, George E.	St. Paul		Schut, Lawrence J.	Minneapolis
	Schaffhausen, Irwin F.	Minneapolis		Schutt, Allan J.	Rochester
	Schaffhausen, Mildred	Minneapolis		Schutt, Ann H.	Rochester
	Schamber, Walter F.	St. Cloud	†	Schwab, Peter M.	Rochester
	Scheidel, Alois M.	Mankato	¶	Schwartau, Neal W.	Rochester
	Scherek, Jerome J.	St. Paul		Schwartz, Carl A.	Hastings
	Scherer, L. Raymond	Minneapolis		Schwartz, E. Robert	Minneapolis
	Scherling, Sidney S.	Minneapolis		Schwartzkopff, Othild	St. Paul
	Scheuneman, Allen F.	Thief River Falls		Schweiger, Theodore R.	Hibbing
	Schiele, Burtrum C.	Minneapolis		Schwinghamer, Thomas G.	Elmwood
	Schiller, Philip J.	Minneapolis	¶	Schwerman, Earl A., Jr.	Rochester
	Schimelpfenig, George T.	Chaska	£	Sciallis, Gabriel F.	Rochester
	Schindler, Richard	Austin		Sciarra, John J.	Minneapolis
	Schirber, Martin J.	Grand Rapids		Scott, Eugene E.	St. Paul
	Schirger, Alexander	Rochester		Scott, Horace G.	Minneapolis
	Schless, James M.	Minneapolis	¶	Scott, James J.	Rochester
#	Schissel, Gregory A.	Washington, D.C.		Scott, Robert H.	Minneapolis
	Schissel, Richard C.	Minneapolis		Scott, William R.	Minneapolis
	Schloff, Ivan	St. Paul	†	Seaberg, John A.	Pequot Lake
	Schloff, Leonard D.	St. Paul			

Sears, Martin E.	Fairmont	Sholler, Lawrence J.	Minneapolis
Seay, James E., III	Minneapolis	Shragg, Robert I.	Minneapolis
Sebald, John R.	Mankato	Shronts, John S.	Minneapolis
Sebrecht, Paul	San Diego, CA	Sidell, Franklin D.	Minneapolis
Seecamp, Carsten H.	Cambridge	£ Sidell, Peter M.	Rochester
Seery, Thomas	Rochester	Siebert, Darrell W.	Luverne
Segal, Edward L.	Minneapolis	Siebert, Richard C.	Minneapolis
Segal, Martin A.	Minneapolis	Siegel, Clarence	West Palm Beach, FL
Segal, Marvin S.	Minneapolis	Siegel, John S.	Virginia
Segal, Sheldon J.	Minneapolis	Siegel, Leighton G.	St. Paul
Seghers, Victor K.	Rochester	Siegmann, William C.	Minneapolis
Seham, Max	St. Paul	Siekert, Robert G.	Rochester
Seifert, Donald R.	Little Falls	Sigel, Melvin E.	Minneapolis
Seifert, Gregory L.	Excelsior	Silas, Ralph M.	Minneapolis
Seifert, Milton H., Jr.	Excelsior	Silver, John D.	Minneapolis
Seisler, Edward P.	Worthington	Silverstein, Murray N.	Rochester
Sejar, Joseph P.	St. Paul	Silverstein, Paul M.	Minneapolis
Sejvar, Joseph P.	St. Paul	Simison, Carl	Barnesville
Sekhon, Mohan S.	St. Paul	Simmonds, Harry N. L.	St. Paul
Seldon, T. Harry	Rochester	Simmons, Richard K.	Minneapolis
Seljeskog, Edward L.	Minneapolis	Simmons, Richard L.	Minneapolis
Sells, Richard J.	St. Paul	Simo, Kathleen Kay	Minneapolis
Selmo, Joseph D.	Norwood	Simons, John N.	Rochester
Semba, Thomas	Minneapolis	Simons, Leander T.	St. Paul
Semsch, Robert D.	Wayzata	Simonson, Donald B.	Minneapolis
Serafano, Donald N.	Davis-Monthan AFB, AZ	Simso, Lee A.	Minneapolis
Sessler, Alan D.	Rochester	Singer, Benjamin J.	St. Paul
Sethre, Arthur E.	Fergus Falls	Singer, Lawrence J.	Minneapolis
Setness, Peter	Forest Lake	Sinykin, Melvin B.	Minneapolis
Setzer, Hobert J.	St. Paul	Sipe, James W.	Coon Rapids
Setzer, Hobert J., Jr.	Mankato	£ Siqueira, Aristarco	Rochester
Severseike, Odean M.	Minneapolis	† Sisk, Harvey E.	St. Cloud
Severson, Michael V.	Minneapolis	† Sisler, Clifford E.	Grand Rapids
Seymour, John L.	Minneapolis	Sjoding, Carl W.	Grand Marais
Seward James B.	Rochester	Sjoding, J. Donald	Mankato
Shackelford, Terry C.	Minneapolis	† Sjostrom, Lawrence E.	St. Peter
Shah, Popattal S.	Osseo	† Skaggs, Harold, Jr.	Travis AFB, CA
Shallal, John A.	Rochester	Skafte, W. F.	Benson
Shandorf, James F.	Minneapolis	Skelly, George A.	St. Paul
Shanks, James R.	Minneapolis	Skinner, Abbott	St. Paul
Shannon, William R.	Faribault	† Skinner, Harvey O.	St. Paul
Shaperman, Eva P.	San Diego, CA	# Skinner, Ira C., III	San Antonio, TX
Shapiro, Fred L.	Minneapolis	Skjold, Arthur C.	Minneapolis
Shapiro, Irving	Minneapolis	Skumatz, Primus J., Jr.	International Falls
Shapiro, Sidney K.	Minneapolis	Skogerboe, Rudolph	Grand Forks
Shapiro, Stanley W.	Minneapolis	Slack, William J.	Duluth
Shattuck, Clark A.	Minneapolis	Slanga, Roger A.	St. Cloud
Shaver, Ward	Fergus Falls	Slater, Edward J.	Bemidji
Shaw, Howard A.	Minneapolis	Sletten, Richard G.	Minneapolis
Shea, Andrew W.	Minneapolis	Slosser, Gaius J.	Minneapolis
Shea, John A.	Rochester	Smeky, Loren A.	Minneapolis
Shear, Howard H.	St. Paul	£ Smigiel, Mitchell R., Jr.	Rochester
Shearin, Robert P. N.	Rochester	Smiley, Donald P.	St. Paul
Sheehan, Joseph C. M.	Rochester	Smiley, John T.	Minneapolis
Shelander, Marcus I.	St. Paul	Smisek, Elmer A.	St. Paul
Shemesh, Alvin	Minneapolis	£ Smisek, Frank M.	Minneapolis
Shepard, Richard	Albert Lea	£ Smith, Adam M.	Minneapolis
Sheppard, Charles G.	St. Peter	Smith, Archie M.	Minneapolis
Sheps, Sheldon G.	Rochester	Smith, Barlow	Edina
Sher, David A.	Virginia	Smith, Baxter A., Jr.	Minneapolis
Sher, Lewis	Minneapolis	Smith, Cyril M.	Duluth
Sherman, Alfred G.	Albert Lea	Smith, Don V.	Blue Earth
Sherman, Carnot H.	Bayport	Smith, George R.	Hutchinson
Sherman, Lloyd F.	Minneapolis	Smith, Graham G.	Minneapolis
Sherman, Royal V.	Red Wing	Smith, H. Nippert	St. Paul
Shertzer, John H.	Fort Bragg, NC	Smith, Harry J.	Lake Crystal
Shick, Richard M.	Rochester	Smith, Henry T.	Minneapolis
Shillington, Maurice A.	Ft. Lauderdale, FL	£ Smith, J. Baldwin, III	Rochester
Shin, Rok	Howard Lake	£ Smith, James C.	St. Paul
Shirley, Raymond M.	Duluth	Smith, John E.	Minneapolis

	Smith, J. Weston	St. Cloud	†	Spurzem, Raymond J.	Anoka
	Smith, Kay P.	Rochester	£	Sridaromont, Somkid	Rochester
	Smith, Lloyd A.	Willmar		Stadem, Clifford J.	Crookston
	Smith, Lucian A.	Rochester		Stafne, John G.	St. Paul
	Smith, Nadine G.	Minneapolis		Stahl, George W.	Austin
	Smith, Ralph E.	Rochester		Stahler, Paul A.	Jordan
	Smith, Theodore S.	Minneapolis		Stahn, Louis H.	St. Cloud
	Smith, Thorsten	Thiells, NY		Stahr, Aubrey C.	Hopkins
£	Smith, V. Roy	Rochester		Stam, John	Worthington
	Smith, Vernon D. E.	St. Paul	£	Stanley, Ronald J.	Rochester
	Smith, Wallace R.	Grand Marais		Standefer, James E.	Stillwater
	Smith, William T.	St. Paul	†	Stanford, Charles E.	Elcho, WI
	Smorstok, Matthew B.	Monticello	£	Staryk, Steven E., Jr.	Rochester
†	Smyth, John J.	Lester Prairie	†	Stauffer, Maurice H.	Rochester
	Smythe, Gwendolyn S.	Austin	#	Stecker, Raymond H.	APO New York, NY
	Smythe, Lowell J.	Austin	£	Stehr, Christian H.	Rochester
	Snider, Howard R.	Mankato		Steidl, Richard M.	Minneapolis
†	Snyder, George W.	St. Paul	£	Stein, Paul S.	Rochester
	Snyder, Robert E.	Spring Valley	†	Stein, Raymond J.	Pierz
†	Snyker, Omer E.	Ely		Stein, Robert L.	Tyler
	Soderberg, Richard J.	Minneapolis		Stein, William A.	Duluth
†	Soderlind, Ragnar T.	Minneapolis		Steinberg, Charles L.	St. Paul
†	Sohlberg, Olof I.	St. Paul		Steiner, Andrew M.	St. Michael
	Soiseth, Robert P.	Minneapolis		Steiner, Leon E.	Albert Lea
§	Solhaug, Michael J.	Minneapolis	£	Steiner, Terrance R.	Rochester
	Solhaug, Samuel B., Jr.	Minneapolis		Steinhilber, Richard M.	Rochester
	Soll, Robert W.	Minneapolis	†	Stelter, Lloyd A.	Minneapolis
£	Solley, Graham O.	Rochester		Stemsrud, Harold L.	Alexandria
	Solvason, Harold M.	Minneapolis	†	Stenstrom, Annette T.	Grand Marais
£	Somerville, Gordon W.	Rochester		Stenzel, Donald A.	Minneapolis
	Sommer, R. K.	Elk River		Stenzel, Joseph A.	Minneapolis
	Sommerdorf, Vernon L.	St. Paul		Stephens, David H.	Rochester
	Sommers, Stephen D.	St. Cloud		Stephens, William E.	Minneapolis
	Sondreal, Wesley D.	Bemidji	#	Stern, Barry L.	San Francisco, CA
£	Sonnemaker, Robert E.	Rochester		Sterner, Donald C.	St. Paul
	Sonnesyn, Nels N.	Le Sueur		Sterner, John J.	St. Paul
	Sontag, David W.	Lake City		Sterrie, Norman A.	Minneapolis
	Sorem, Milton B.	St. Paul	£	Stevens, John W.	Rochester
	Soriano, Dominador B.	Onamia		Stevens, Sheridan S. H.	Minneapolis
	Saucheray, John A.	St. Paul	£	Stevenson, Edward K.	Rochester
	Soucheray, Philip H.	St. Paul		Stevens, William W., III	Rochester
	Sosey, Walter K.	Crosby		Stewart, Donald E.	Crookston
	Soule, Edward H.	Rochester	£	Stewart, John W.	Rochester
†	Souster, Benjamin B.	St. Paul		Stewart, Marvin J.	Minneapolis
	Sowada, Ernest J.	St. Paul		Stewart, Paul B.	Minneapolis
†	Spagnolo, Anthony A.	Shakopee		Stewart, Richard O.	Winona
†	Spang, Anthony J.	Duluth		Stickler, Gunnar B.	Rochester
†	Spang, James S.	Duluth		Stickney, J. M.	Rochester
	Spang, William M.	Duluth		Stiegler, Farrell S.	Minneapolis
	Spano, Joseph P.	Minneapolis		Stifter, Anton J.	Winsted
	Speckhals, Robert C.	Faribault		Stiles, Clifford D.	Foley
£	Speirs, Harvey R.	Rochester	£	Stillman, M. Thomas	Minneapolis
	Spencer, Bernard J.	Minneapolis		Stillwell, George K.	Rochester
	Spencer, David L.	Minneapolis	†	Stillwell, Walter C.	Mankato
	Spencer, Joseph F.	Duluth	†	Stillwell, George G.	Rochester
	Spencer, Robert J.	Rochester		Stoker, Lynn C.	Albert Lea
	Spenny, Edward A. L.	Minneapolis		Stolee, Curtis N.	Le Sueur
	Sperl, Michael P., Jr.	St. Paul		Stolee, Thomas A.	St. Paul
	Spiekerman, Ralph E.	Rochester		Stolen, Keith H.	Grand Rapids
	Spieler, F. B.	Pequot Lakes		Stoltz, Robert C.	Minneapolis
	Spilseth, Paul	Stillwater		Stone, Norman F.	Minneapolis
	Spink, Wesley W.	Minneapolis		Stone, Stanley P.	Minneapolis
	Spittell, John A., Jr.	Rochester	£	Stone, Stephen P.	Rochester
	Sponsel, Kenath H.	Minneapolis		Stonnington, Henry H.	Rochester
	Sprafka, Gregory A.	St. Paul		Storsteen, Kenneth A.	Duluth
	Sprafka, Joseph L.	St. Paul		Stover, Laddie E.	Marshall
†	Sprague, Randall G.	Rochester		Stoy, Robert A.	Little Falls
	Spraitz, Anton F., Jr.	St. Paul		Strait, Herbert S.	Minneapolis
				Strand, Clarence M.	Minneapolis

STRAND-THIELEN

Strand, Jack W.Jasper
 Strand, Peter J.Minneapolis
 Strand, Richard C.Bloomington
 Strand, Roger W.Willmar
 Stransky, Theodore W.Owatonna
 Strate, Richard G.St. Paul
 Strathern, Carleton S.St. Peter
 Stratte, Alf K.Pine City
 Stratte, Harold C.Windom
 Stratte, Jon R.Stillwater
 Strauchler, JohnBelview
 Straus, Maurice L.St. Paul
 Street, BernardNorthfield
 Streitz, John M.Duluth
 Strem, Edward L.St. Paul
 Streu, Richard E.Minneapolis
 Strewler, Gordon J.Duluth
 Strickler, Jacob H.Minneapolis
 Steinger, Gene C.St. Paul
 Strobel, Claire J. A.Mankato
 Strobel, Jack L.Minneapolis
 Stroebel, Charles F., Jr.Rochester
 Strom, Gordon W.Minneapolis
 Strom, Robert L.Minneapolis
 Stromgren, Delph T.Minneapolis
 Stromme, William B.Minneapolis
 Strong, Cameron G.Rochester
 Strough, LaVern C.Worthington
 Strouth, Jonas C.Virginia
 Strunk, Clarence A.Minneapolis
 Struthers, Lewis E.Parkers Prairie
 Stubbs, Samuel E.Rochester
 Stuber, Robert R.St. Joseph, MO
 Student, Richard E.Minneapolis
 Studer, Donald J.Faribault
 Sturges, Robert L.Minneapolis
 Sturley, Rodney F.St. Paul
 Su, Man-Mei, NadineRochester
 Su, W. P. Daniel.Rochester
 Subak, Barbara H.Minneapolis
 Subby, WalterMinneapolis
 Suh, Ku WonRochester

Sukov, MarvinMinneapolis
 Sulciner, AurelMinnetonka
 Sullivan, CorneliusSt. Paul
 Sullivan, W. Albert, Jr.St. Paul
 Summar, M. ThomasFridley
 Summerskill, William H.Rochester
 Sun, Nora C. J.Rochester
 Sundberg, A. BruceMinneapolis
 Sundt, Thoralf M., Jr.Rochester
 Sung, David T. W.Rochester
 Sutherland, John E.Indian Head, MD
 * Svien, Hendrik J.Rochester
 Swaiman, Kenneth F.Minneapolis
 Swallen, Thomas O.Minneapolis
 † Swanson, David A.Minneapolis
 Swanson, David W.Rochester
 Swanson, Gerald E.Minneapolis
 £ Swanson, Gene E.Rochester
 Swanson, John O.Minneapolis
 Swanson, Lawrence J.West St. Paul
 Swanson, Ralph H.West St. Paul
 # Swanson, Wallace L.Quito Ecuador, So. Amer.
 Swedberg, William A.Duluth
 Swedenburg, Paul A.Glenwood
 † Sweetser, Horatio B.Minneapolis
 Sweetser, Theodore H., Jr.Minneapolis
 Swendseen, Carl J.Minneapolis
 † Swendsen, James J.St. Paul
 Swensen, Don P.Duluth
 † Swenson, Arnold O.Duluth
 Swenson, Donald B.St. Paul
 Swenson, Donald B.Mankato
 Swenson, Floyd J.Minnetonka
 Swenson, James D.Edina
 Swenson, Orville P.Cloquet
 Swenson, Richard W.Minneapolis
 Swenson, Roy G.North Branch
 Swift, Dean C.Minneapolis
 Sy-Ong, MatildeSt. Paul
 Symchych, Boris E.Minneapolis
 Syverson, Leslie A.Fergus Falls

T

Taddeini, LuigiSt. Paul
 Taintor, Ronald W.Marshall
 Tajik, Abdul J.Rochester
 Takahashi, RaymondRochester
 Talsness, Jon M.International Falls
 Tam, Ernest C.Minneapolis
 Tambornino, Joseph M.Minneapolis
 Tan, RubyMarshall
 Tanaka, ShinMinneapolis
 Tanasichuk, Murray A.St. Paul
 Tangedahl, Tim N.Bismarck, ND
 Tangen, George V.Minneapolis
 Tani, George T.St. Paul
 Tanquist, Edwin J.Alexandria
 Tanquist, Edwin J., Jr.Alexandria
 Tapia, Hugo R.Rochester
 Tarm, FelixRochester
 Taswell, Howard F.Rochester
 Tate, Wayne E.South St. Paul
 Taufic, MansurAustin
 Taylor, Joseph H.Ft. Lauderdale, FL
 Taylor, Ross M.Thief River Falls

Tchou, Mien-FaMinneapolis
 Teeter, Richard R.St. Paul
 Teich, Kenneth W.McKeesport, PA
 Teisberg, John E.St. Paul
 Telander, Robert L.Minneapolis
 Tempel, J. W.Blue Earth
 ten Bensel, Robert W.Minneapolis
 Tenner, Robert J.Minneapolis
 Terrell, Bernard J.Mt. Vernon, MD
 Tesch, Gordon H.Elk River
 Teska, Byron A.Minneapolis
 Testor, James V.Winona
 Tetlie, James P.Duluth
 Teynor, Joseph W.Minneapolis
 £ Thaell, John F.Rochester
 Tharp, RalphMinneapolis
 Thayer, Ellsworth A.Fairmont
 Thalhuber, Wayne H.St. Paul
 Thelemann, Arthur R., Jr.Minneapolis
 Theobalt, Inge M.Minneapolis
 Theologides, AnthanasiosMinneapolis
 † Thielen, R. D.New Brighton

Thiem, Chester E.	Mankato
Thienes, R. Lawrence	St. Cloud
Thomas, John V.	Duluth
Thomas, Juergen E.	Rochester
* Thomas, William H.	Minnetonka
Thomasson, Robert D.	Minneapolis
Thomes, A. Boyd	Minneapolis
Thompkins, Richard B.	Rochester
Thompson, Arthur	Minneapolis
Thompson, A. Henry	St. Peter
† Thompson, Conrad O.	Rochester
Thompson, Carl O.	Hendricks
† Thompson, Gershom J.	Rochester
Thompson, James I.	Duluth
Thompson, James R.	Bemidji
Thompson, Paul E.	Long Prairie
£ Thompson, Robert R.	Rochester
Thompson, Russell A.	Willmar
Thompson, Thoburn F.	Albert Lea
Thompson, V. James	Staples
Thompson, Wayne W.	St. Paul
† Thomson, James	St. Paul
£ Thorteinsson Guoni	Rochester
Thorbus, Ruben S.	Karlstad
Thorsgard, Ernest O.	Thief River Falls
Thorson, Stuart V.	Minneapolis
£ Throckmorton, Tom D.	Rochester
Thurber, Deloran L.	Rochester
Thurn, Roy J.	Duluth
Thuringer, Carl B.	St. Cloud
Thysell, Desmond M.	Minneapolis
Thysell, Vernon D.	Moorhead
Tierney, Jon P.	Minneapolis
Tietz, Charles A.	Virginia
Tiffany, Francis B.	St. Paul
Tifft, Cyril R.	St. Paul
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Reports From

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MINNESOTA MEDICINE

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Legacies of Regional Medical Programs

WINSTON R. MILLER, M.D.*

AS NEW LEGISLATION is being drafted to replace or revise Regional Medical Programs (RMP), legacies of this eight-year program would help to stimulate continuation of innovative features which have proved to be productive.

The movement for creative change in the health care system is like a great river which derives greatness from its many tributaries. In spite of local and national vicissitudes, this federal-private partnership program has provided tributaries to the river of change. Waters have cleared and become more sparkling, and there is an aura of cooperative enthusiasm. Professional satisfaction has been derived from central coordination and reporting, successful completion of innovative projects and adoption of demonstrated improvements by permanent components of the health care system.

Many private foundations and public institutions have recently adopted RMP objectives of regional cooperative arrangements, medical center outreach, bridging the gaps between new knowledge and its application, more optimum quality and equality of health care services, greater access to care, greater teamwork in delivery of services, and more relevant educational programs for health manpower.

Reports of RMP program activities provide the most readily understood evidence of accomplishments. But the unique characteristics of the RMP process, referred to by some as an *exquisite process*, constitute a principal virtue of the program. To the extent that innovative characteristics have been successful and productive, they can and should be incorporated into new or revised programs. This report presents a brief discussion of the principal components of the RMP process.

The FEDERAL—PRIVATE PARTNERSHIP concept implied a fraternal relationship between the fed-

eral bureaucracy and private health care units. Although difficult to accomplish and fraught with suspicions on both sides, this type of relationship needs further expansion as the federal financing role increases in the health care system. Regulation, licensure and certification alone cannot stimulate private initiative for optimum personal health care.

As a FREE-STANDING LOCALLY CONTROLLED HEALTH AGENCY, RMP was a first among federally supported programs. A separate corporate structure became favored, and the free-standing organization was timely and effective in bringing many dissident groups together during this period. Lack of political or institutional control at both local and national levels constituted both a virtue and a handicap. Lack of control by any existing organization allowed local authority with democratic decision making, but weakened support for continuation. Self-definition of "health service area" geographic boundaries supported functional arrangements but caused confusion and conflict in relationships to local governmental units. In spite of functional variations, state boundaries and some type of on-going organizational political attachment seem to offer more potential for the future.

The INCENTIVE AWARD SYSTEM to stimulate voluntary commitment of local resources and initiative represents a time-honored approach in American society. In RMP it was unique in reaching out to the "grass roots" and involving all of the "actors" in the health care delivery system. Also unique were the degrees of accountability, cooperation and evaluation required. Partly because of these features, all RMPs gained momentum slowly at first, and some never have achieved recognized success. Among the majority which have been successful, the incentive system has stimulated a progressive movement for improving the delivery of more optimum health care services. As cost controls become more ominous and authoritative, incentive programs like RMP be-

*Program Director of Northlands Regional Medical Program, Inc., from November 1967 to July 1973. Opinions presented are those of the author and do not constitute endorsement by NRMP, Inc., or the Department of Health, Education and Welfare.

come relatively more important for maintaining a desirable balance between regulation and private initiative.

The REGIONAL ADVISORY GROUP of each RMP implemented an unbiased decision-making process by a widely representative local council. As a sense of broad social responsibility was acquired, these groups demonstrated judicious concern in deciding the most important program activities to be supported with public funds. Many planning, review and management processes developed by RMP Regional Advisory Groups have been adopted by other organizations and agencies. The RAG deserves a better understood and more prestigious name, and a permanent role in Research and Development programs in health care.

RESEARCH AND DEVELOPMENT PROGRAMS like RMP have accelerated the advancement of Applied Research as a scientific discipline. Applied Research and Development can bridge the gap between acquisition of new knowledge by fundamental research personnel and wide application for social benefit by health service personnel. Characterization of unmet needs, measurable objectives in behavioral terms, milestones in project performance and objective evaluation of results constitute important components. Characteristics of Applied Research are demonstrated in many of the articles in this supplement.

The "GRAND PLAN" concept promulgated by RMP and other programs visualized a total picture of a completely coordinated plan. Rapidly changing key issues at relatively short intervals confuses a master plan approach, but many RMPs were able to have a *general picture plan* with several identified sections and pieces within these sections, which fit together like a jig-saw puzzle. For example, Quality of Care is one section and contains many components. In the series of reports in this publication, six articles relate directly to quality of care. It can be readily surmised how they fit together and provide mutual reinforcement. The Grand Plan concept stimulated each RMP to coordinate all activities closely and to direct more specifically what kind of projects would be funded. The "Contract Offering" approach pioneered by NRMP proved to be a successful method and was adopted by many other RMPs. It is a form of *directed* or *programmed* Research and Development. It is an interesting line of reasoning to pursue—we know what the general problem areas are; we know or can deter-

mine the various characteristics of a general problem in different areas; and with carefully planned support and guidance we can stimulate capable people to try out various plausible solutions to the specifically defined problem. If adequate evaluation is included, we can then demonstrate the degree to which the problem can be solved.

The MULTIDISCIPLINE STAFFS of RMPs consisting of highly qualified and respected professionals were unique and played key roles in catalyzing creative change. The *convening* role promoted cooperative commitment by many organizations to program objectives and maintained coordination of multiple interrelated activities. The *consultation* role provided assistance and guidance for many small institutions and for project planning, design and operation. The *liaison* role strengthened relationships between multiple segments of the health care system. *Planning and Feasibility Study* roles provided clearer definition of problem areas and guidance for development of plausible solutions. *Project Planning, Review and Management* roles carried out principles established by the Regional Advisory Group. *Communication and Public Relations* roles promote maximum application of RMP Research and Development activities. The traditional *administrative* role constituted only a small portion of staff responsibilities but did require finesse to establish and maintain a strong public image for the RMP. A "Directed Research and Development Program" needs this kind of a staff, and the RMP experience can serve as a prototype for future programs.

COORDINATED COMMUNICATION AND PUBLIC RELATIONS aspects of RMP demonstrated applications of those scientific disciplines to the health care system. The 65 extramural projects and 37 staff studies of NRMP resulted in 47 articles in health-related journals, over 13,000 column inches in newsprint in papers throughout Minnesota, an uncounted number of radio and TV programs, many conferences and symposia, and a set of "Archives of NRMP" containing 115 reports. All emphasized the coordinated regional program.

The large number of new processes pioneered by RMP for initiating and directing social change in the health care system readily explain why it was difficult for many people to understand what RMP was all about. And yet many of these new processes proved to be successful and will serve as prototypes for new programs. They constitute the greatest legacies of Regional Medical Programs.

Cervical Cancer Mortality Study

A Preliminary Report

CERVICAL CANCER MORTALITY SUB-COMMITTEE*

THE ORGANIZATION and objectives of the Cervical Cancer Mortality Study were described in the July 1972 issue of MINNESOTA MEDICINE. This study was undertaken by a sub-committee of the Obstetrics, Gynecology and Maternal Health Committee of the Minnesota State Medical Association and sponsored jointly by the Northlands Regional Medical Program, the Minnesota Division of the American Cancer Society and the Minnesota State Board of Health. It was designed to analyze retrospectively all deaths that occurred in a two-year period from cervical cancer in the state of Minnesota. By study of the circumstances associated with the course of the disease in each case, it was intended to delineate deficiencies in diagnosis, treatment, and followup care. The preliminary report encompasses the first 46 cases reviewed by the Cervical Cancer Mortality Sub-committee.

Materials and Methods

All death certificates listing carcinoma of the cervix or uterus as the cause of death for the calendar years 1971 and 1972 were extracted by the State Department of Health and sent to the investigator members of the sub-committee. These certificates were reviewed to determine the actual site of tumor origin. If a decision as to origin of the tumor could not be easily made, a detailed investigation was conducted and the collected data presented to the sub-committee for a decision. Most death certificates were, however, complete and accurate.

Cases were excluded from the study if primary treatment had been given out of state. To initiate a case study a questionnaire was mailed to the physician who signed the death certificate to ob-

tain the names of all other physicians including pathologists involved in the total care of the patient, as well as dates, place, and details of all hospitalizations. Once the questionnaire was returned all cytologic smears taken during the five years prior to diagnosis, and all cytologic and/or histologic material associated with follow-up care were requested. In addition, autopsy slides were requested where applicable. All cytologic and pathologic material was independently reviewed by a three member panel of pathologists to confirm the original diagnoses. Questionnaires were also sent to other physicians who participated in the patient's care, and in cases where radiotherapy had been administered the details of external beam and radium therapy obtained.

The pooled data for each case was organized to form a rough chronologic summary. In nearly every case, however, it was necessary for the case investigator to personally review hospital and office records, as well as interview one or more of the physicians involved to obtain complete details of the patient's history, diagnosis, therapy, and follow-up. The record reviews and personal interviews were conducted by physicians knowledgeable and experienced in the detection, diagnosis, and treatment of gynecologic malignant disease. Once the case summary was completed it was presented to the twelve member Cervical Cancer Mortality Sub-Committee for final review and evaluation.

In each case review several aspects of the cervical cancer death were considered by the sub-committee. The five year period prior to the onset of cancer symptoms was reviewed to ascertain the adequacy of gynecologic care, if any, received by the patient. The care in this period was considered adequate if a pelvic examination and a Pap smear were performed on an annual basis. If the five year period in question antedated the widespread use of cytologic screening, standards of adequate care were liberalized. In cases where

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this antecedent care was considered inadequate, the committee judged whether or not the inadequate care contributed to the patient's death and assessed the responsibility to the patient alone, to the physician(s), or to both patient and physician(s).

The period from the onset of symptoms to establishment of the diagnosis of cancer was evaluated. Care was judged to be adequate or inadequate, and, if inadequate, contributory or non-contributory to the patient's death.

The procedures performed to establish a definite diagnosis of cervical cancer were reviewed. Procedures were classified as appropriate or inappropriate with respect to the clinical findings. For example, a cone biopsy of the cervix was considered inappropriate if a gross lesion was present. Appropriate procedures were classified as complete or incomplete and inappropriate procedures were ruled either contributory or non-contributory to the patient's death.

Consultation was not deemed necessary only if the responsible physician was a gynecologist or a radiotherapist. Consultation was judged as either appropriate or inappropriate. Inappropriate consultation was assumed to be inadequate whereas appropriate consultation could be either adequate or inadequate. Failure to stage the disease using FIGO guidelines, for example, was considered by the committee to be inadequate consultation even if the consulting physician was an appropriate consultant.

Primary therapy was assessed and considered either appropriate or inappropriate depending on the stage of the disease. The adequacy of therapy was also assessed. Follow-up care after primary therapy was considered by the committee using the criteria of a pelvic examination and Pap smear every 3-6 months for three years, then annually thereafter. Responsibility for inadequate care was duly placed.

Secondary therapy, if any, was considered as either palliative or curative. Evaluation of the adequacy of curative therapy was carried out.

Finally, the overall responsibility for non-cure was assessed. If, in the evaluation, death was determined to be the result of a disease other than cervical cancer, it was ruled non-preventable. This category also applied to deaths resulting from tumor progression in spite of appropriate therapy and to deaths from complications of that therapy. Only deaths resulting from progression

of the cancer following inadequate care and/or inappropriate treatment were considered preventable. In these cases, responsibility for non-cure was attributed to the patient alone, or physician(s) or to both the patient and physician(s).

Results

Of the first 46 patients whose cases were reviewed only six (13%) had adequate gynecologic care in the five years prior to symptoms. Of the 40 patients receiving inadequate care, over half had not consulted a physician over this period. Although the others had, for the most part, been under medical care regularly for unrelated medical and/or surgical conditions, a pelvic examination was not performed at any time. In all but three cases this inadequate care was deemed contributory to the patient's ultimate demise.

Once symptoms appeared 60% received adequate care and a prompt tissue diagnosis was established; 40% received inadequate care. In these the majority did not seek medical attention within a reasonable period of time. In a few cases, the failure of the physician to aggressively seek the cause of the abnormal symptoms resulted in undue delay in establishing a diagnosis.

Example: Case #6 "A 69-year-old lady complained of post-menopausal bleeding. Pelvic examination by her physician found the vaginal apex to bleed easily. A Pap smear was negative. A diagnosis of atrophic vaginitis was made. Nineteen months later when heavy vaginal bleeding occurred, a Stage II-A carcinoma of the cervix was discovered."

Only 63% of the patients received appropriate and complete diagnostic studies. Twenty-two percent had an obvious cervical lesion yet inappropriate steps were taken to establish a diagnosis. In some cases only a Pap smear was done and in others a full scale cervical conization was performed.

All patients received appropriate consultation prior to therapy. In 20%, however, consultation was inadequate because the consultants failed to stage the lesion. In one patient the consultant described a pelvic mass and obtained a Pap smear which was reported as Class IV. A tissue diagnosis, however, was never established.

Primary therapy was appropriate and adequate in 72% and for the most part consisted of irradiation therapy to the pelvis using one of several standard techniques. Some patients had inadequate radiation therapy because deterioration of their medical condition precluded further treatment.

ment. One patient had the radium applicator dislodge from the cervix at an unknown time during therapy; one patient's therapy was interrupted because of an exacerbation of pelvic inflammatory disease and additional dosage was not added to compensate for the significant delay. Two patients were treated with chemotherapy alone because of advanced disease and two received no treatment at all.

Follow-up care after primary therapy was accomplished in almost all patients. In most follow-up care was deemed adequate, and consisted of regular examinations and Pap smears. In those having inadequate care the inadequacies were generally attributable to failure of the physician to recognize signs or symptoms of recurrent or persistent disease. In only one case did the patient herself bear the full responsibility of inadequate follow-up care.

Example: Case #12. "A 61-year-old woman was treated with irradiation for a Stage I-B carcinoma of the cervix. She returned to her physician at regular intervals over the next several years. Eighteen months after therapy a suspicious Pap smear was obtained. A cervical biopsy showed only inflammation. Suspicious or positive Pap smears were obtained four, six, and seven years after treatment but no further investigation was done. Thirteen years after treatment a gross extensive recurrence of cancer was found by another physician."

Treatment for recurrent or persistent disease was carried out in the majority of patients, but an attempt at cure was carried out in only five. Four of these had radical surgery. Except for one post-operative death, the patients succumbed to recurrent disease, two of them living five additional years.

Discussion and Conclusion

The Cervical Cancer Mortality Study is now one year old and the review of the deaths for 1971 and 1972 is approximately one-third completed. To date, only gross patterns are discernable. In general, however, management of the patient with cervical carcinoma in Minnesota appears to be reasonably adequate once the patient reports to her physician. There are, unfortunately, inordinately large numbers of women who are not receiving an annual pelvic examination and Pap smear screening. In most cases, these are women who do not seek medical attention of any kind, and for various reasons may not be aware of the value of such screening. The most disillusioning aspect of the study, involves the significant numbers of women who, despite regular contact with their physician, do not receive a pelvic examination. It is reasonable to assume that if survival statistics for patients with carcinoma of the cervix are to be improved, earlier detection is an absolute necessity.

Problem Oriented Medical Records in A Private Hospital

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SINCE PUBLICATION of Weed's, *Medical Records, Medical Education, and Patient Care*,¹ there has been increasing enthusiasm for Problem Oriented Medical Records (P.O.M.R.) throughout the country. Justification for the

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Problem Oriented System as a tool for improved patient care and problem solving is best illustrated in the article by J. Willis Hurst, M.D., entitled "Ten Reasons Why Lawrence Weed is Right."

Drawing from Weed and Hurst and our own practical experience it is the purpose of this paper to describe a project which was developed to accomplish a threefold mission:

1. Adoption of P.O.M.R. in a community hospital.

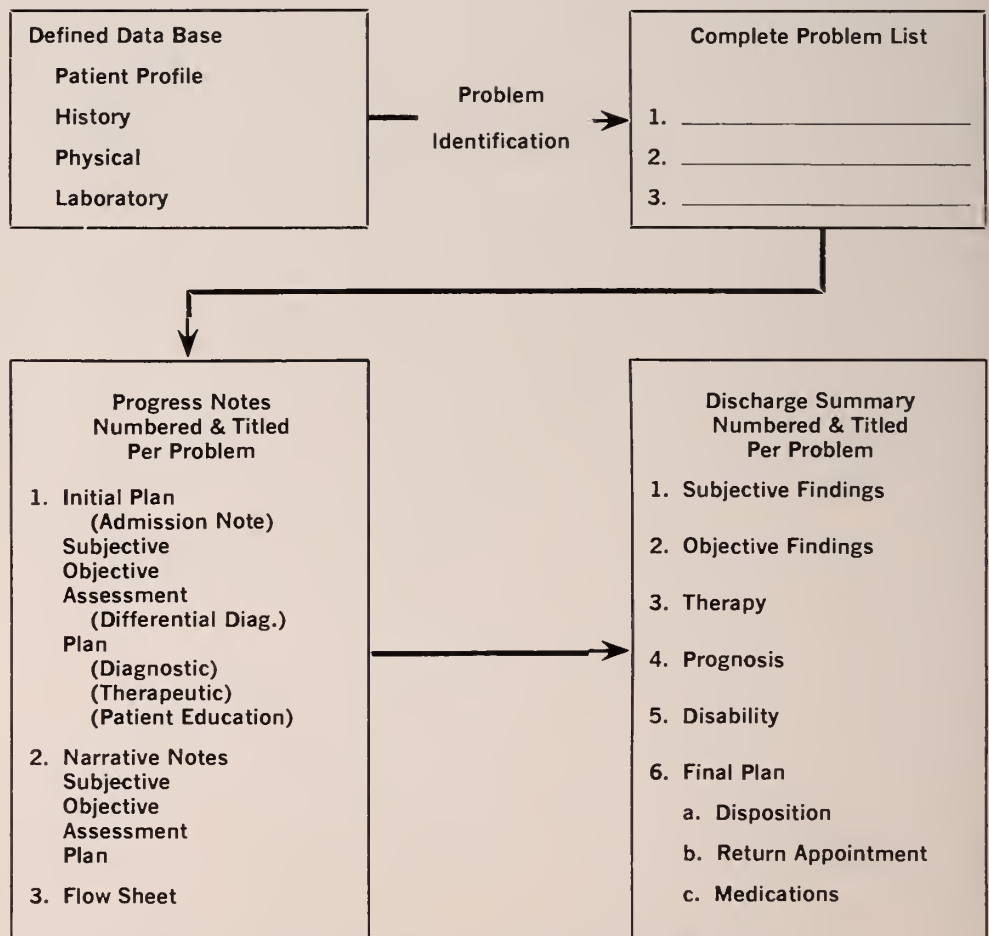


Figure. Components of the Problem Oriented Medical Record

2. Application of medical audit to P.O.M.R.
3. Development of team care approach through use of interdisciplinary health records.

To many physicians medical records (including hospital charts, insurance and medicare forms and office records) are not among the most enjoyable features of the practice of medicine. Fortunately the problem oriented system has made a dramatic change in the attitudes of physicians and nurses toward medical records. At our institution a number of staff physicians and nurses were very interested in the problem oriented approach to medical care. In fact it was their enthusiasm that precipitated the undertaking of this project.

Summary of the Problem Oriented System

The problem oriented medical record consists of four components: data base, problem list, progress notes with initial plan and discharge summary (Figure).

An essential part of the data base is the patient's profile. To quote Dr. Weed, the patient's profile is "the physician's understanding of the whole patient in his life situation."¹ The patient profile should provide anyone viewing or reviewing the chart some understanding of the patient's typical day, his life style, his occupation and hobbies, his relationship to friends and family, and his general attitude toward his health and problems. It replaces the traditional "social history" in a much more structured fashion. The remainder of the data base consists of a traditional history and physical including a chief complaint and baseline laboratory information.

The problem list, key to the P.O.M.R. should list "problems" at the level of understanding of the physician at the time he compiles the list. Although a problem list generally will grow as more problems are elucidated, the basic problem list can usually be completed within 24 hours. Problems can be defined as "anything that concerns the patient or the physician"¹ and should include the complaint leading to admission, significant items in the past medical history, significant abnormal laboratory values, and important behavioral or psycho-social problems.

Progress notes should be recorded in a systematic fashion clearly demonstrating thought processes of the physician or nurse as well as basic medical information. The initial plan should include systematic evaluation of each problem at

the level of sophistication available at the time. It also includes diagnostic procedures contemplated, therapeutic plans, and appropriate patient education. Progress notes are organized by problem number, problem title and the date and time of writing. A useful new format is the S.O.A.P. technique:

S. Subjective information documents complaints or concerns of the patient relative to the particular problem.

O. Objective information includes physical findings and laboratory data regarding the problem.

A. Assessment reflects the physician's or nurse's interpretation of physiologic or psychologic implications of subjective and objective findings. Inasmuch as the problem list reflects information available at a particular time, assessment may include diagnostic guesses and "ruleouts" as well as more obvious and substantiated conclusions.

P. Plan demonstrate physician or nurse objectives in alleviating, correcting or modifying the problem.

In an attempt to condense and improve medical records, flow sheets are becoming more important as a means of graphically demonstrating pertinent information in a sequential and easily understandable fashion.

As the final component of the problem oriented record, the discharge summary includes separate notations for each problem. It consists of both subjective and objective information, including results of laboratory procedures and therapeutic measures for each problem during the hospital stay. In addition it includes: condition on discharge, prognosis, duration of disability, a final plan for disposition of the patient, return appointments, and all discharge medications. The summary is designed to provide for continuity of care from hospital to clinic, extended care facility or nursing home and must therefore be completed at the time of discharge. As a secondary benefit it provides office staff with information necessary to complete insurance, compensation, medicare, or welfare reports.

Methodology

Initiation of change in traditional systems is a difficult process. This is particularly true in the area of medical records since effects on the patient are not as dramatic as those of a new surgical procedure or a new medication. As Dr. Weed

has said, "when you decide to change the basic premises under which you have been operating—memory dependency, uncoordinated specialization, no feed back, no controls—when you decide to change those, of course it's going to be hard."³

Initially we developed a concise but reasonably complete manual for use of the problem oriented record system. Copies of this manual were distributed to all nursing stations, to all resident physicians and to interested staff physicians. The manual has proven to be the most significant product of this project. It provides the reader with a good understanding of the problem oriented system without extensive reading.⁴

A group of interested staff physicians and family practice residents initiated problem oriented records on approximately half of the admissions to the hospital. As more physicians were exposed to the problem oriented records of their colleagues, requests were received from additional physicians for an opportunity to become involved in this method of record keeping.

At the same time nurses and paramedical personnel began problem oriented techniques. The nurse medical record analyst instructed staff nurses, both in groups and on a one-to-one basis in problem orientation of nursing notes. This process was started on a single station and gradually expanded to include all nursing stations. The records analyst was available at any time for consultation in problem identification and charting clarification. Didactic sessions were held with nurses on evening and night shifts as well. As nurses became more comfortable with problem orientation of their records and in particular with the concept of making broad assessment of subjective and objective findings, the concept of interdisciplinary charting gained increasing acceptance. The development and merits of this method will be published in a separate report.

Audit

To paraphrase Dr. Weed, if one intends to approach medical records in a scientific manner, it is essential:

1. That you have a system,
2. That you audit performance,
3. That you audit the system itself.

At Bethesda Hospital three types of audit were performed. First was an audit of the medical record itself; second was a, subjective audit of physicians and nurses regarding attitudes and

opinions of the record; and third was an audit of the quality of care delivered for specific diseases comparing problem oriented and traditional records.

Chart Audit

A. Non-Problem Oriented Records

All audits were performed by physician using a specially prepared audit form. (Sample shown on page 16). Of the 29 non problem oriented charts reviewed, two were found to be excellent, eleven acceptable and sixteen unacceptable. Significant comments by auditors were as follows: All problems not evaluated and followed; admission not justified; complications not documented; no justification for most orders main problem was incomplete evaluation no documentation of many problems recognized on review.

B. Problem Oriented Records

Problem oriented records were reviewed on three occasions. A sample of the audit form is shown on page 17. Initial audit of problem oriented records during the developmental stages of the project involved sixty charts. The results of the review were as follows: Excellent—1, good—25, acceptable—3, improvement needed—26, unacceptable—5. Significant findings of reviewers are broken down into various components of the record system. The patient profile was not adequate in almost fifty percent of cases. Problem lists in many instances were incomplete; many inactive problems were not mentioned; and many problems were not kept current. Analysis of progress notes indicated that the S.O.A.P. format was frequently not used and there seemed to be problems with communications. Twenty-two percent of the charts had no initial plan. The principal deficiency in the discharge summary was that all listed problems were not discussed. Evaluation of nurse notes revealed difficulties with format, lack of objective data one-third of the time, a total lack of impressions and obviously poor communications with physicians.

The audit of 51 charts during the intermediate phase of the project showed little difference in the overall evaluation: One rated as excellent, twenty-two as good.

twenty needing improvement, seven as unacceptable and one as poor. The findings of reviewers were essentially the same as those in the previous audit.

The final audit, involving 25 interdisciplinary charts showed definite improvement: Sixty percent received an excellent or good rating; thirty-two percent showed need for improvement; and eight percent were considered unacceptable. Reviewers commented that nurses' notes had improved and more nursing impressions were recorded on progress notes. In addition, they found that both communication and the quality of nursing observations were markedly improved. The principal deficiency with the charts continued to be that of keeping the problem list current and complete with inclusion of inactive problems.

Subjective Audit of Problem Oriented Record

A subjective audit questionnaire was distributed to 20 physicians and 43 nurses in October 1972 and February 1973. Responses in October included 14 physicians and 32 nurses; in February 14 physicians and 36 nurses. Results were as follows:

1. Has P.O.M.R. changed your approach to the patient?

	M.D.		Nurses	
	October	February	October	February
Yes	50%	71%	18%	55%
No	35%	7%	81%	41%
Questionable	14%	0%	.....	.....
No Response	.....	7%	.....	.....
Other*	.....	14%	.....	2%

*Always used P.O.M.R.

Comments: More complete evaluation; more organized, logical approach; more complete care of total patient, more interest in social aspects; more aware of problems other than admitting diagnosis; helped improve my observation skills; I ask questions now requiring subjective responses.

2. Do you believe your patient care has improved?

	M.D.		Nurses	
	October	February	October	February
Yes	79%	86%	38%	50%
No	7%	.....	62%	47%
Questionable	14%	.....	.....	2%
Other*	.....	14%	.....	.....

*Always used P.O.M.R.

Comments: Able to organize and keep track of specific and multiple problems; problems followed up which were otherwise ignored; more thorough; fewer overlooked lab values; reminder of patient's total condition; helps establish priorities in care; helps to quickly evaluate changes in patient's condition; better observations—more effort to obtain subjective viewpoint.

3. Do you feel the chart is more useful to you?

	M.D.		Nurses	
	October	February	October	February
Yes	93%	93%	97%	72%
No	7%	.....	3%	23%
Questionable	.....	7%	.....	.....
No Response	.....	.....	.....	5%

Comments: Able to review chart faster and more effectively; easier to extract data and follow patient's condition; easier to read; organized and more systematic, more meaningful; more aware of doctor's thinking; better communication.

4. Has the P.O.M.R. improved communication between all involved in the care of your patient?

	M.D.		Nurses	
	October	February	October	February
Yes	72%	93%	75%	56%
No	14%	.....	19%	30%
Questionable	7%	7%	6%	3%
No Response	.....	.....	.....	11%
"Potentially"	7%	.....	.....	.....

5. Has the P.O.M.R. assisted your prompt evaluation of hospital patients not under your direct care, but who require your immediate aid?

	M.D.	
	October	February
Yes	86%	93%
No	.....	7%
Questionable	14%	.....

6. Has the P.O.M.R. had any bearing on length of your patient's hospital stay?

	M.D.	
	October	February
Yes	7% ▼ Stay	14% ▼ Stay 7% ▲ Stay 14% No details
No	40%	43%
Questionable	43%	21%

CHART REVIEW—Traditional Record

	Acceptable in Quality	Unacceptable	Absent
Initial Data Base			
1. Is there an admission note on the progress sheet?	_____	_____	_____
2. Does the admission note adequately define reason for admission?	_____	_____	_____
3. Does admission note delineate significant medical problems essential to the patient's care?	_____	_____	_____
4. Is the History and Physical complete, including any pertinent social or family history?	_____	_____	_____
Orders			
1. Is there appropriate documentation in the admission note for any of the following initial orders?			
Patient Activity	_____	_____	_____
Medication	_____	_____	_____
Treatments	_____	_____	_____
Laboratory Tests	_____	_____	_____
Diagnostic Procedures	_____	_____	_____
Special Treatment (P.T., O.T.)	_____	_____	_____
Special Nursing Procedures	_____	_____	_____
2. Do the progress notes acknowledge significant positive or negative findings which justify additional evaluation or consultation?	_____	_____	_____
3. Does the final order include:			
Patient Education	_____	_____	_____
Discharge Plan	_____	_____	_____
Discharge Medication	_____	_____	_____
Progress Note			
1. Are there daily progress notes?	Yes_____	No_____	
2. Does the chart contain progress notes such as "doing well," "status quo," or "no change?"	Yes_____	No_____	
3. Do progress notes accurately reflect the patient's status and progress?	_____	_____	_____
4. Does the final progress note include discharge plans?	_____	_____	_____

PROBLEM ORIENTED MEDICAL RECORDS

CHART REVIEW—P.O.M.R.

DATA BASE	Yes	No	Comment
1. Is patient profile present and adequate?	_____	_____	_____
2. Is History and Physical complete but concise?	_____	_____	_____
3. Are baseline laboratory reports included?	_____	_____	_____
PROBLEM LIST			
1. Is list complete?	_____	_____	_____
2. Are problems titled correctly?	_____	_____	_____
3. Are active and inactive or resolved problems correctly entered?	_____	_____	_____
4. Is list current?	_____	_____	_____
5. Are problems stated at physician's level of certainty?	_____	_____	_____
INITIAL PLAN			
1. Is SOAP format properly used?	_____	_____	_____
2. Does assessment or interpretation include differential diagnoses?	_____	_____	_____
3. Are special diagnostic tests or consultation in consonance with the problem list?	_____	_____	_____
4. Is there a logical process demonstrated for any medical or surgical therapy?	_____	_____	_____
5. Does plan include patient education where appropriate?	_____	_____	_____
PROGRESS NOTE			
1. Is SOAP form properly used?	_____	_____	_____
2. Are significant subjective data included?	_____	_____	_____
3. Are significant objective data included?	_____	_____	_____
4. Is assessment supported by both subjective and objective data?	_____	_____	_____
5. Is problem title compatible with assessment?	_____	_____	_____
6. Is the plan appropriate for assessment?	_____	_____	_____
7. Has necessary patient education been included in the plan?	_____	_____	_____
8. Is there evidence of proper communication between physician, nurses, and paramedical personnel?	_____	_____	_____
9. Are flow sheets being properly utilized?	_____	_____	_____
DISCHARGE SUMMARY			
1. Is significant subjective data from onset of problem to present included?	_____	_____	_____
2. Is significant objective data included?	_____	_____	_____
3. Does treatment include effects on subjective and objective findings?	_____	_____	_____
4. Are therapeutic complications noted?	_____	_____	_____
5. Is physician's interpretation included?	_____	_____	_____
6. Does plan include follow up care, discharge medications or other therapy?	_____	_____	_____
7. Are above areas discussed for every significant problem on the problem list at time of discharge?	_____	_____	_____
NURSES NOTES			
1. Is SOAP form properly used?	_____	_____	_____
2. Are significant subjective data included?	_____	_____	_____
3. Are significant objective data included?	_____	_____	_____
4. Is Impression supported by both subjective and objective data?	_____	_____	_____
5. Has patient education been included in plan?	_____	_____	_____
6. Is there evidence of good communication between doctors, nurses, and paramedical personnel?	_____	_____	_____
7. Are flow sheets being properly utilized?	_____	_____	_____
8. Is extremely significant data entered on progress note?	_____	_____	_____
9. Are above entries (8) timed and dated?	_____	_____	_____

7. Does the P.O.M.R. increase your time invested in patient management?

	M.D.		Nurses	
	October	February	October	February
Yes	71%	71%	19%	39%
No	29%	22%	69%	25%
Questionable	.....	7%	6%	6%
No Response	.....	.....	6%	25%

Audit of Quality of Care

To audit the quality of care we used disease entities for which our hospital has established pattern criteria. This type of audit has been performed for over two years and is essentially the same as the quality assessment program of the Joint Commission on Accreditation of Hospitals. Comparative audits were conducted to study problem oriented records versus traditional records in urinary tract infection, hypertension and presurgical evaluation. With the number of patients involved and the limited time available we were not able to demonstrate any statistically significant difference in quality of care between the two record systems. A single exception was the presurgical evaluation study in which electrolyte abnormalities and liver function abnormalities were noted as problems on the problem list of P.O.M.R. records and acknowledgment of these abnormalities was made by the attending physician with appropriate therapy. In contrast, in the non-problem oriented records the instances of abnormal chemistries or electrolytes were not documented nor was there any documentation of an effort to modify these abnormalities prior to general anesthesia. It

is our intent to conduct more extensive audits of this nature, recognizing their limitations, but hopefully drawing some conclusions concerning relationships of quality of care to the quality of the record.

Summary

A workable and concise manual of the problem oriented record system proved to be very helpful in implementing P.O.M.R.

Family practice residents and interested staff physicians applied problem oriented charting to the majority of patients in a community hospital.

After nurses became proficient in the techniques of problem oriented nursing notes, integrated charting was implemented on a substantial portion of the patient population.

Audits of the quality of the medical record showed improvement as physicians and nurses became more familiar with this system. Attitude surveys of the P.O.M.R. demonstrated favorable reception and supported continuation of this program.

Additional audits are being conducted in an effort to measure more accurately the effects of the problem oriented system on quality of patient care.

The problem oriented medical record system has made a dramatic impact on medical records and medical education. However, it is primarily a tool for problem solving and does not lessen the need for good clinical judgment. It does serve as a vehicle for improving health maintenance requiring recognition of the patient as a whole, including psycho-social as well as pathophysiologic problems.

"If you say the whole patient is not your responsibility, you are a technician."⁵

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Continuing Education for Nurses

A Problem Oriented System

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NURSES CAN PLAY a greater role in the care of hospitalized patients. The traditional view of nurses held by many other health care professionals has not included the nurse as a data collector and decision maker, even though the nurse has often functioned in those roles. Indeed, many physicians see the nurse as one who says "I am only following orders."

In order to improve patient care at United Hospitals, Miller Division, St. Paul, Minnesota, a program of continuing nurse education was begun in August 1972. The program tried to enlarge the data collection and decision-making role of the nurse, and to improve communication between physicians and nurses.

The educational program utilized the problem oriented system^{1,2} to educate nurses around individual patient care situations, taking maximum advantage of the "teachable moment." The term "teachable moment" is one used to describe the following concept: In the clinical situation the best setting in which to learn new information is one at or near the bedside, when the need for, and application of, the new information is immediate.

The fundamental purpose of most hospital admissions is to make decisions and solve problems for the patient, when such tasks cannot be done as an out-patient. The nurse often functions in a decision-making role. Although the physician decides the diagnosis and prescribes treatment, the bedside nurse is often called upon to make important moment-to-moment decisions—

Is the patient's headache a tension headache (which requires only aspirin), or a symptom of a hypoglycemic reaction or of a subarachnoid hemorrhage (each of which requires immediate intervention by a nurse or physician)?

Is the patient confused because he is senile

(which requires reassurance and a night light), or because he is sedated too much (which requires change in drug therapy), or because he is hypoxic (which requires major intervention)?

Many of the major decisions in patient care consequently involve interim solutions to diagnostic or therapeutic problems. What is the cause of the patient's headache? What is the cause of the patient's confusion?

Before we began this project, it was not uncommon to find that staff nurses did not know why the patient was admitted to the hospital, whether any new problems had developed since admission, or why they were giving a certain medication or treatment. Many therapeutic maneuvers were carried out without any notation of results. The chart of a patient given nitroglycerin as a diagnostic test for angina, for example, had no notation anywhere in the nurse's notes about the effect of the medication. Many observations were made without an assessment of their meaning. A nurse would duly record in her progress notes that a patient experienced lightheadedness, diaphoresis, extreme hunger and confusion, but she would not conclude that the patient was having a hypoglycemic reaction from the regular insulin administered three hours previously. Many such deficiencies in nursing observations and judgments diminished the effectiveness of patient care.

Just as often, however, the nurse provided excellent patient care—making appropriate observations, giving treatment judiciously, providing emotional support, and teaching the patient about his illness. But such activities were rarely recorded and rarely was this superior nursing care commended and given special recognition. A professional should know when she is doing a good job, receive reinforcement by superiors, and help in teaching her peers.

The self-image of nurses was identified as an additional problem. Often the nurse was reluctant to suggest modes of care, question orders or bring new information to the attention of the physician, and this reluctance reflected her own self-view as that of a lesser professional. The realities of the

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hospital situation are, however, that the bedside nurse is in attendance around the clock and is often a more appropriate person to make interim decisions and judgments than the attending physician who may be a floor, a block, or a mile away.

Objectives

Traditionally the "nursing process" has been subdivided into four parts: assessment, planning nursing care, intervention, and evaluation of care.³ The objective of this project was to more fully develop three roles of the nurse which express the "nursing process" somewhat differently—the nurse as data collector, the nurse as decision-maker, and the nurse as patient-teacher.

Methods

Four nursing stations (three general medical-surgical units and one intensive care unit) were selected to implement the program.

Nurses on each station were instructed in the problem oriented system of collecting and recording data. The following points were stressed:

1. The nurse should be able to identify all of the patient's problems, and a list of problems should be included in the patient's kardex. Communication from nurse to nurse and from shift to shift should

center on describing the progress of each of the defined problems. In a situation where there was no physician-generated problem list, the nurse was instructed to generate such a list—from her own interview of the patient, from the physician's history and physical, from data evolving during the course of hospitalization, or preferably, from combinations of these three sources.

2. The nurse should identify new problems as they evolve and assess their significance. Two critical questions should be asked: "Is the new problem related to any of the old problems?", and "Is the new problem related to the treatment of any of the old problems?"
3. Data should be recorded in the nurse's notes according to the problem to which they relate. A structured method of recording makes data reproducible and provides quick access to important information for nurse colleagues. The S.O.A.P. method of recording (Figure 1) was selected as best suited to the purpose of the project.
4. The problem list could not be considered complete unless all drugs and treatments could be related to identified problems.

Each nursing station was oriented to the system on one day and the method was implemented immediately on the following day. Since the project centered around individual patients, teaching was directly applied to patients at hand. No purely didactic sessions were held.

At least once a week, one of us observed a nurse report session at which the day shift nurses reported on patient progress to the evening shift.

	Problem	Progress Note
3/7/73 8 A.M.	#1—Uncontrolled Diabetes Mellitus a) Insulin Administration	S: "I have always administered my own insulin and am not aware of any problem. I always inject insulin into my thighs." O: Observed patient draw up and administer insulin herself. She did not cleanse bottle with alcohol prior to drawing up insulin. Drew up 15 U NPH instead of prescribed 18 U and then expelled approximately 4 U when trying to eliminate air bubble. Injected into indurated area of right thigh. A. Lacks understanding of proper technique and importance of accuracy. Inaccuracy of insulin dose compounded by visual problems. Induration of thighs due to lack of rotation of injection sites. I feel difficulty with diabetes control related to above findings.
3/7/73 1 P.M.	#1—Uncontrolled Diabetes Mellitus a) Insulin Administration	P. Reviewed correct technique for insulin preparation and administration with return demonstration using syringe with wide calibrations. Instructed re: rotation sites and suggested use of abdomen. Reported visual problems to physician for follow-up. A. New syringe effective in facilitating accuracy of dosage. Technique understood and appropriately executed.

L. Rheault, R.N.

Key: S—subjective data (patient perceptions); O—objective data (observations by nurse or other health team members); A—assessment (nurse's conclusions about the meaning of the observations); P—plan and actual intervention, including teaching of patient.

Fig. 1—Problem oriented nurse's progress notes.

The observer reviewed patient charts before the session in order to be familiar with each patient's medical history and clinical course. The nurse responsible for the patient reported the following information to her relief: patient's name and clinical problems, observations during the shift pertinent to each problem, overall progress of that problem, and priorities of care for the next shift. Most patients had more than one problem on which to report.

The role of the project directors in these teaching sessions was two-fold:

1. To structure the nurse session according to the following format:

Are all of the patient's problems identified?

Are appropriate observations being made on this patient with diabetes (or coronary heart disease, or herniated disc, etc.)?

If they are not, what observations should be made?

What complications should one look for in this patient who has just had a cholecystectomy (or a myocardial infarct, or a pulmonary embolus, etc)?

Do all prescribed medications and treatment correspond with defined problems?

Are new problems related to any old problems, or to treatment of any old problems?

2. To act as information source, and raise the pertinent clinical questions about each patient's problems.

When a nurse notes "muscle spasms" in a patient who has just had a thyroidectomy and she does not recognize that she is observing hypocalcemic tetany, the teaching begins with this fact. The discussion then encompasses, in succession, causes of hypocalcemia after thyroidectomy, complications of thyroidectomy in general, other causes of hypocalcemia, and complications of treatment.

The following questions about a patient with diabetes mellitus are raised and discussed:

What are the reasonable goals for management of carbohydrate metabolism? Discussion includes rationale for therapy and use of insulin.

What complications may confuse urine test readings? Discussion includes the fact that a poorly emptying diabetic neurogenic bladder provides a urine specimen which inaccurately estimates the blood sugar.

Why does the diabetes go out of control? Discussion includes various events usually upsetting diabetic control—infection or other acute illness, diet abuse and poor injection technique.

Nurses were given homework in the form of clinical problems. Descriptions of clinical situations presented a need to recognize and interpret the meaning of a new problem. The homework as discussed at the next weekly meeting. Discussion of the case illustrated in Figure 2 touched on: (1) the need to recognize that the patient was confused; (2) possible causes of confusion, suggested by the list of problems and treatments—hypoglycemia, too much sedation, or worsening of congestive heart failure; and (3) the necessary nurse intervention for this situation.

Sylvia Glick, age 72, has been hospitalized one week. At 4 P.M. she calls the nurse and says repeatedly, "Five times five is twenty-five, five times five is twenty-five." Prior to that time, she had been perfectly lucid.

Problem	Treatment
1. Diabetes Mellitus— onset 1954	1500 Cal. diet NPH insulin 40 units q A.M.
2. Cerebral arteriosclerosis— onset 1968	Valium 5 mgm. tid
3. Coronary heart disease Congestive heart failure— onset 1962	Lanoxin 0.25 mgm. q.d.
What's the name of the new problem? How would you proceed to handle it?	

Fig. 2—Sample homework case study

During the week, one of us (V.G.) visited the nursing station, reviewed records, and moderated sessions with floor nurses. In these sessions each nurse reviewed a chart on a current patient cared for by one of her nurse colleagues. The following questions were raised:

Do the notes reflect recognition of the patient's problems, logical reasoning, and the care provided to the patient?

Was the data recorded sufficient to describe the problem and its course?

Was an appropriate assessment made of new observations?

What was good about the care given?

How would you improve upon the care given?

What is the progress of nurse education for this patient?

Results

Did this project and its approach to nurse education actually improve patient care?

The Nurse as a Data Collector and Decision Maker

Nurses identified more patient problems and acted upon them. A number of specific instances were observed where the expanded role of the nurse was important in improving care.

1. An elderly patient with anemia was admitted from a nursing home. Hemoglobin was 8 gm.%. The physician continued the prn order for Phenaphen for arthritis. Recognizing that Phenaphen contains aspirin, the nurse reasoned that aspirin could cause gastritis and occult bleeding. She called the attending physician and shared her reasoning with him. The physician discontinued this medication and ordered a bland diet, antacids and appropriate tests to identify the source of blood loss.
2. A middle-aged woman with varicose ulcers was placed at enforced bedrest by her physician. She had a history of phlebitis and pulmonary embolus following a cholecystectomy three months previously. The nurse recognized that enforced bed

rest placed this patient at greater risk for further leg vein thrombosis and pulmonary emboli, and she called the physician who then ordered anticoagulant therapy for prophylaxis.

3. A nurse began hot packs on a patient with an infiltrating I-V. She commented, "Why wait until the patient complains of pain and phlebitis develops?" She recognized that infiltrating I-V's place the patient at risk for phlebitis and initiated an appropriate preventive measure.
4. A middle-aged patient developed a fecal impaction. The nurse called the attending physician to suggest substituting an alternative to the prescribed codeine analgesic. She had correctly asked herself "Is this new problem, fecal impaction, related to current treatment?" By simply scanning the medication list she saw that the patient was taking codeine.
5. A patient with chronic obstructive lung disease developed moderately severe headaches while receiving aminophyllin. The nurse wondered if the headache was caused by the aminophyllin and raised this question with the physician. He lowered the dose of aminophyllin, and the headache disappeared.
6. A patient on warfarin developed a bladder infection with fever. Aspirin was ordered for the fever, and the nurse, recognizing that aspirin could potentiate the anticoagulant effect of warfarin, called the physician who substituted acetaminophen for the aspirin.

About fifty nurses participated in this project and responded to a questionnaire exploring its impact on their practice. Most felt that the problem oriented approach made them more aware of why patients were hospitalized, why tests were ordered, and why certain medications and treatments were prescribed. Most felt that they had become more skilled in identifying new problems and more thorough in seeking the cause of new problems.

The Nurse as Patient Teacher

The nurse's role as patient teacher became more visible. One nurse evolved an extremely effective way of evaluating a patient's management of diabetes. She observed the several steps involved as the patient removed insulin from the vial and gave the injection. Whenever a step was executed in a faulty way, she immediately gave instructions for the correct technique. Her method of recording (Fig. 1) was extremely useful to the physician in re-emphasizing a much-overlooked cause of failure to control diabetes—faulty self-administration of insulin.

Complicated instructions to the patient were no longer concentrated in the last day of the hospitalization. Instead the nurse often used much of the entire hospitalization to teach her patient and to reinforce her teaching with repetition. During this time she taught the diabetic patient about hypoglycemia and other aspects of diabetic care.

She counseled the patient on anticoagulants about the various manifestations of bleeding. She laid out a schedule of drug administration for the post-pancreatectomy patient who required twenty pills a day and used the hospitalization time to explain the rationale of therapy.

Nurse Satisfaction and Self Image

Did the nurse's satisfaction with her own work improve? Did her own self-image improve? Most participating nurses responded "yes" to these questions. Nurse morale on stations using this system improved. Nurses began to teach each other. They felt more comfortable in dealing with each one of their patients because they were aware of all of the patient's problems. The following comments illustrate: "If I don't know something, I feel compelled to look it up and study about it." "I feel as though I am treating a whole patient rather than just a disease." "I am finding myself more willing to find out things about patients, both physical and social." "I am finding I am more comfortable working with various diagnoses." "I feel more involved with the patient—there is more communication with doctors concerning daily progress and medication . . . and all this is a learning process." "It's good to see how my evaluations and notes have helped the patient's progress."

Nurses were less and less reluctant to question physicians about diagnostic concepts and rationale for therapy. As the nurse became more aware of the reasons for tests and therapy, she became better able to interpret hospital events to the patient.

Discussion

This was a project for improving care through ongoing day to day nurse education centered around the nurse's current patients. The problem oriented system was adopted to emphasize many of the steps involved in collecting data, making decisions and teaching patients. The problem oriented system does not guarantee good care, but it does provide a structure and an auditable record so that one can identify care which needs to be improved.

The problem oriented system allows one to identify different levels of nurse performance, and the needs at each level. The skilled nurse does not necessarily improve with the system, but she does obtain positive reinforcement of her activities. The system allows her to describe her activities. To

the extent that a nurse can describe what she does, she is better able to learn from her own experience, to mature in her skills, and to teach one who is less skilled. The system gives the less skilled nurse a structure by which to acquire new information. Her progress notes and their deficiencies help to identify her educational needs.

Once the educational needs of each nurse are defined by the system, teaching in depth can be adapted to these needs. Is an in-depth discussion of clinical disorders of calcium metabolism, for example, appropriate for the nurse? Certainly! She is the most likely one to first observe tetany after thyroidectomy (or the lethargy from too much calcium replacement) and she must recognize the problem in order to act.

Ongoing monitoring is needed on each nursing station. While the authors filled this role in this project, a more ideal situation is one in which the head nurse becomes the catalyst for ongoing education, problem identification, and problem solving.

Physician participation in clinical education for nurses is crucial. The physician and the nurse each has experience and viewpoint to offer the other. Each must have easy access to the other at all times and be able to discuss such questions as:

Doctor, what sort of information do you need from the nurse to help care for our patient?

Nurse, what sort of recurring observations do you make in the course of managing a pa-

tient with *diabetes* (or *chest pain* or *hypertension*) that require some decision?

Nurse, what sort of information do you need from the physician in planning for our patient?

Once the habit of collaboration is established, the nurse is less reluctant to question the physician, and the patient is better served. Indeed, when the line of communication between physician and nurse breaks down, errors in judgment often occur at either end.

Finally, we feel that data collection, problem identification, and problem solving are appropriate roles for nurses. These skills should be taught in greater depth at the undergraduate level and the teaching should be continued once the nurse is in practice.

Summary

Three roles of the nurse are described which are often unrecognized by physicians—the nurse as a data collector, as decision-maker, and as patient-teacher.

An educational program was designed to more fully develop these roles in a community hospital. Continually supervised, this program became a primary source of continuing education for nurses, provided great personal satisfaction for the nurse in her daily practice, facilitated nurse-physician collaboration and improved patient care.

Drug Trade Name: Phenaphen—contains phenacetin, aspirin, hyoscyamine sulfate and phenobarbital.

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Monitoring Hospital Quality and Productivity

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CONSIDERING THE delivery of health services, are the terms quality and productivity consonant or antithetical? Quality, the degree of excellence that makes the service reliable,¹ has been an outstanding characteristic of modern health care delivery. However, the influences of several current issues—consumerism, government regulation, increasing involvement of hospitals in malpractice litigation—have brought more emphasis to bear upon the quality of health services.

Productivity, the relationship between the volume of services produced and the input of labor time,² has become a popular topic for discussion and analysis because of increasing labor costs and the shortage (real or imagined) of qualified health manpower. Since the labor component accounts for approximately 60% of total hospital expenses,³ effective staff utilization becomes a prime target in productivity improvement efforts. In the 20-year period from 1950 to 1970, the number of hospital employees per 100 patients had increased 53 percent.⁴ Yet, a manpower crisis is predicted as remedies are sought for the problems of health care accessibility and acceptability.

While many still cling to the concept that productivity is the enemy of quality,⁵ the need to optimize both of these factors is obvious and urgent. One solution to this dilemma could be the use of cost effectiveness analysis—a comparison of alternative ways of accomplishing an objective according to which contributes the most for a given cost or achieves a given objective at the least cost.⁶ In this context, the analysis would determine the method of staff assignment and utilization which achieves the highest quality of service or which achieves a predetermined level of quality at the least labor cost.

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Any attempt to analyze and improve the cost effectiveness of health care must incorporate a measurement mechanism which will simultaneously monitor the significant factors of productivity and quality. The results of these measurements can then be used to determine the optimum relationship between these two factors.

The authors describe here the development and implementation of a voluntary internal information system which periodically measures indicators of hospital productivity and service quality.

Systems Analysis Program

Management engineering, or industrial engineering, may be defined as "the art and science of utilizing and coordinating men, equipment, and materials to attain a desired quantity and quality of output in a specified time and at an optimum cost."⁷ This field includes the techniques and philosophies of method improvement, system analysis, operations research, management science and behavioral science. While the application of management engineering in hospitals dates back to the early 1900's, many persons in the health care industry tended to regard this profession with suspicion and distrust because of the unprofessional activities of "efficiency experts" during the 1920's and 30's.⁸

Industrial engineering concepts have met with more favorable acceptance in the past 20 years due to the influences of rising costs, shortages of qualified personnel, and the public's demand for more services.⁹ More recently, hospitals have pooled their efforts and expertise in this field by forming cooperative, multi-hospital management engineering programs.¹⁰

In 1969, the Minnesota Hospital Association formed such a program, the MHA Management Engineering Division (MED). To maximize results and to avoid the image of the "efficiency expert" who undertakes studies with little knowledge of health care operations, Management Engineering Division services are designed to aid the

institution in achieving improvement through *on-going efforts of its own in-house staff*. This approach is rather unique since most other groups provide management engineering services on a one-time or intermittent basis through a group of professional engineers who are employed by a central agency.

The *MED Systems Analysis Training Program* was developed to train hospital and nursing home personnel in the theory and application of basic industrial engineering techniques such as cost analysis, method improvement, scheduling, job analysis, inventory control, and general problem solving. The principal offering is an intensive, 1-week session designed to prepare students for full-time positions as systems analysis practitioners. Through a one-week Department Managers Workshop, a team approach is emphasized whereby the systems analyst is a technical resource available to management personnel for problem-solving studies of many forms. The analyst's contribution involves the collection and technical analysis of pertinent information, but the appropriate manager retains the responsibility for problem identification and the selection of alternative solutions.

Through five offerings of the Systems Analysis Training Program, Minnesota hospitals and nursing homes, rural and urban, have trained over 40 systems analysts and 250 department managers. One participating hospital, utilizing two full-time analyst positions, generated savings of \$538,900 after analyses of many departments. By projecting this experience to all institutions which have participated, total savings of the systems analysis program can be estimated at 2.8 million dollars over the past three years.

NRMP Project

While the effectiveness of the MED Systems Analysis Program has been proven, there is a pressing need to correlate improved staffing utilization with analysis of quality of care. This demonstration project was undertaken to develop and to implement a system for concomitant monitoring of quality and staff utilization in three Minnesota hospitals: St. Paul-Ramsey Hospital, St. Paul (515 beds); Rice County District One Hospital, Faribault (103 beds); and Glencoe Municipal Hospital, Glencoe (54 beds). Several quality audit and staff utilization systems, as developed by various multi-hospital management engineering programs,¹¹ were reviewed and test-implemented according to the following criteria: (1) accuracy

and reliability; (2) ease of application by systems analysts; (3) ease of maintenance as an ongoing information system; (4) general applicability to most areas of the hospital; (5) acceptability by all levels of hospital personnel.

Quality Audit

The purpose of the quality audit portion of the project was to develop a quality measurement program for the nursing department which could be used as a model for other departments. The program drew heavily from existing methods and developments described in the literature.¹²⁻¹⁶ It should be emphasized that the nursing quality audit is a measure of the total nursing care administered to the patient, not a measure of individual patient care or professional performances by RN's.

Standards from the literature were used as a basis for development of local guidelines for measuring performance. Two examples are as follows:

Nutrition—Fluid & Electrolyte Balance¹⁷

1. Assure proper intake by—
 - (a) giving oral fluids, I.V. fluids, and tube feeding as indicated.
 - (b) withholding fluids when necessary.
 - (c) maintaining an adequate food intake.
2. Assess electrolyte status by observing and recording abnormal signs and symptoms.

Oxygen & Ventilation¹⁷

Measures for providing adequate oxygen and ventilation are—

- (a) encouraging patient to cough, turn and deep breathe.
- (b) checking patency and position of nasal catheter, cannula, or mask.
- (c) checking liter flow of oxygen.
- (d) using proper technique and equipment for suctioning.
- (e) keeping tracheostomy site clean.
- (f) checking respirators for proper functioning.

These Standards for quality patient care were developed by the nursing administration group during the project in one institution, while in another, previously developed Standards were applied. The Standards were made available to all members of the nursing staff involved in their performance.

Audit Committee members were selected from the nursing staff and assigned the responsibility of: (1) constructing and testing a checklist to use when auditing patient care; (2) establishing a routine procedure for auditing; (3) conducting an analysis of the results; and (4) making recommendations to the appropriate department heads.

The systems analyst assisted the Committee by tabulating the results and graphing the quality index.

Audit Checksheets corresponding to local "standards" were developed for the patient record, the nursing care plan, and the patient environment (including direct observation of the patient's care and the patient's opinion of the care). Two examples of audit checksheets from the literature are as follows:

Nutrition—Fluid & Electrolyte Balance¹⁸

	Yes	No	Comment
1. Are oral fluids given, restricted and recorded as indicated?			
2. Are fluid and food within patient's reach?			
3. Are fluids removed from bedside if NPO?			
4. Are I.V. fluids administered correctly (type, rate, labeling)?			
5. Has patient been assisted adequately with eating?			
6. Is the patient receiving the correct diet?			

Oxygen & Ventilation¹⁸

	Yes	No	Comment
1. Has the patient been encouraged to turn, cough and deep breathe at designated intervals?			
2. Is oxygen therapy properly given?			
3. Has the patient been suctioned correctly?			
4. Is the tracheostomy patent and the site clean?			
5. Are respirators used correctly?			

The forms were kept short to facilitate completion in 10-30 minutes and were validated by duplicate audits on the same patient. The inclusion of a "safe level care" question is still under study. This would be used when a high number of "yes" responses were obtained, but one very important factor of quality/safety was missing. A penalty to the score would then be applied.

The *Audit Procedure* included the use of a sampling technique whereby a sufficiently large sample was taken to reflect characteristics of the total situation. Systems analysts constructed random time and random patient selection tables to be used by auditors. Analysts also determined the number of audits necessary to monitor quality care accurately on a continuing basis. Auditors were selected from the nursing staff and trained

to assure consistency of results.

Calculation of the percentage of affirmative answers on the checksheet produced a quality index. This index was graphed for comparison with the indices of staff utilization. This provided a picture of the quality level of patient care and staffing level trends over a period of time.

Analysis of results was conducted by the audit committees. Interpretation of analyses led to specific recommendations for corrective action e.g. initiation or changes in educational and/or orientation programs, supervisory action, change in policies, revision of procedures, re-evaluation of job descriptions, elimination of worksheet questions when continuous 100 percent performance was achieved and addition of new questions as the Standards were strengthened.

Some *Results* of the audit program were surprising. The program produced positive change independent of authoritative decree. Staff auditors upgraded their own performance and that of their colleagues. The "live" in-patient audit generated a high level of interest and all levels of nursing personnel participated. Specific identification of weaknesses enhanced the planning of educational programs for both the staff and the patients. Evaluation of the effectiveness of educational programs, supervision, and assignment of personnel to patients was improved.

Staff Utilization

The purpose of the staff utilization portion of the project was to develop and test a tool for measuring and controlling hospital productivity in accordance with quality standards developed through the quality audit. Two existing hospital wide staff utilization systems were installed and evaluated in the three hospitals. Termed staffing methodologies, these systems set forth a procedure for measuring and predicting the level of staffing required to perform each department function.¹⁹ The methodologies define all significant tasks performed by hospital personnel, and indicate the standard time which should be required to complete each task.

A standard time may be defined as *the time to complete a unit of work when performed with a given method at a prescribed rate of work, with provision for unavoidable delays, fatigue, and personal time.*²⁰ Generally, a standard time is determined by observing and recording a representative time to complete a task, adjusting that time

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o the normal rate of work (rating), and adding an allowance for personal time, fatigue, and delays. Staffing methodologies qualify standard time values by specifying the method and type of equipment used in the task. In some cases, several standard times will be listed for a single task in order to accommodate alternative methods and equipment.

Figure 1 shows a typical standard development worksheet from a staffing methodology. Standard hours per unit of workload are shown for tasks performed in the medical records department. During implementation of the system, the frequency of occurrence of each activity is counted for a base period of time, usually 28 days, and recorded under "quantity for period." (The representativeness of this frequency of occurrence data is checked by examining annual records, seasonal fluctuations, etc.) Multiplying the "standard hours per unit" by the "quantity for period" yields the total standard time required to complete the workload for each activity during the base period. Staffing for these activities is considered variable; that is, staffing requirements fluctuate in accordance with increases or decreases in the workload.

The standard time for all variable activities in the department is totaled and then divided by the single indicator of workload volume—in this case, number of discharges in the base period.

Most methodologies also include a section for calculating the staffing requirements for constant workload activities such as supervision, clerical, in-service education, etc. The workload for these activities is fixed during the short run and the appropriate staffing level is usually determined by hospital policy. For this reason, standard hours of staffing for the constant workload are not given in the methodology; instead, typical staffing hours per calendar day are used.

Once the base period data and calculations have been completed, this information can be used in future reporting periods to assess staff utilization and to predict future staffing requirements. At the conclusion of a reporting period (usually 28 days), the number of workload units completed by each department is counted and recorded. Multiplying the workload units by the standard hours per unit yields the total staff time required to complete the variable workload. Similarly, the calendar days in the reporting period

Standard Development Worksheet—Medical Records					
I. Variable Workload					
Activity	Standard Hours Per Unit		Quantity for Period		Standard Hours Required
A. Discharge Processing					
1. Coding (ICDA)					
a. Set-ups	.026	×	480	=	12.48
b. Processing (discharges)					
1. New Born	.014	×	48	=	0.67
2. Obstetric	.029	×	50	=	1.45
3. Medical	.037	×	222	=	8.21
4. Surgical	.033	×	160	=	5.28
F. Total Variable Hours Required					
Base Period				=	714.4
G. Total Discharges—Base Period				=	502
H. Variable Hours/Discharge (F ÷ G)				=	1.42
II. Constant Workload					
A. Supervisory				=	175
B. Clerical				=	80
C. Inservice Education				=	5
D. Total Constant Hours—Base Period				=	260
E. Total Calendar Days—Base Period				=	28
F. Constant Hours/Calendar Day (D ÷ E)				=	9.29
III. RMS Standard = Variable Standard + Constant					
1.42 hours discharge × _____ discharges/reporting period				=	_____
				+	_____
9.29 hours/calendar day × _____ calendar days/reporting period				=	_____
RMS Standard				=	_____

Figure 1

multiplied by the constant hours per calendar day will yield the staffing requirement for the constant workload. This calculation for the medical records department is as follows:

$$\begin{aligned}\text{Staffing Hours} &= 1.42 \text{ hours/discharge} \times 550 \text{ discharges} \\ &+ 9.29 \text{ hours/calendar day} \times 28 \text{ days} \\ &= 1,041 \text{ hours}\end{aligned}$$

This standard time can then be compared to the actual staffing time which was used during the period to determine staff utilization performance. Staffing levels can also be predicted by estimating the workload for a future period and applying it to the above formula.

During the project, the staff utilization methodologies were installed simultaneously with the quality audit. In each test site hospital, the methodologies were introduced first to administrative personnel and then to department managers. Local staff Systems Analysts were given in-depth training in the various work study techniques required to install the methodologies. During the installation period, it was necessary for the analyst to review all tasks in each department to insure that the method and equipment were the same as that used in the methodology, to evaluate the reasonableness of the standard time values, and to identify any tasks which were not included in the methodology. Much of the workload volume data was collected and recorded by department managers during the base period.

After installation of the two methodologies, staff utilization reports were generated in each hospital for approximately three months. Each

methodology was then reviewed and evaluated by the systems analysts and department managers with assistance from members of the project staff. The Resource Monitoring System (RMS), developed by the Hospital Association of New York State, was chosen as the superior staff utilization system since instructions are straightforward, lists of departmental tasks are comprehensive, most of the standard times are applicable, and the format of the report was more useful.

Resource Monitoring System Report

A sample of an RMS periodic report is shown in Figure 2. One variable workload indicator is listed for each department in the second column together with the number of workload units completed during the reporting period. The actual hours of staff time, taken from payroll records are shown in the next column. The calculated standard staffing hours for the period are shown in the fourth column.

Target staffing hours, listed in the fifth column, are provided for use in those departments where particular circumstances negate the achievement of 100 percent staff utilization. For example, departments such as emergency, labor, and delivery rooms typically involve "stand-by" time where staff must be present regardless of the workload level. Similarly, inefficiencies due to an antiquated physical plan and obsolete equipment will reduce staff productivity. In these cases, a realistic target level of hours is estimated by analysts and department managers to reflect optimum staff utilization under existing circumstances. In practice,

RMS

PERIODIC REPORT

HOSPITAL: COMMUNITY PERIOD: MARCH

DEPARTMENT	PRODUCTIVITY UNIT	ACTUAL HOURS WORKED	STANDARD HOURS REQUIRED	TARGET HOURS	UTILIZATION INDEX
TECHNICAL SERVICES	TREATMENTS - 900	772	725	733	95%
ADMITTING	ADMISSIONS - 813	560	565	569	102%
LAUNDRY	POUNDS - 105,600	3230	2800	2957	92%
DIETARY	PATIENT DAYS - 6600	6160	4600	4620	75%

FROM PAYROLL

FROM RMS STANDARDS

ACTUAL
TARGET

Figure 2

The target hour value is used in lieu of standard hours for comparison with actual hours worked. Comparison of target hours to standard hours is also used as a basis for setting phased goals for improving the hospital system.

The staff utilization index for each department is shown in the righthand column. The index is calculated by dividing target (or standard) staffing hours by actual hours used. Thus, a 100 percent utilization index indicates that actual staffing hours equaled target (or standard) hours; an index of less than 100 percent indicates an overstaffing situation, and an index of greater than 100 percent reflects understaffing.

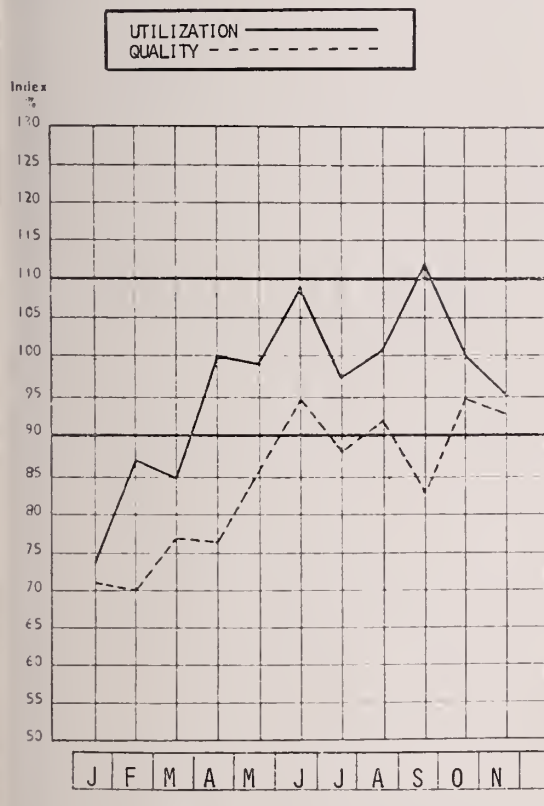
Correlation of Quality Index with Staff Utilization Index

Used in conjunction with the quality audit, this index provides the ability to measure quality per-

RESOURCE MONITORING SYSTEM
MONTHLY PERFORMANCE REPORT

COMMUNITY HOSPITAL

NURSING DEPARTMENT



MANAGEMENT ENGINEERING DIVISION
MINNESOTA HOSPITAL ASSOCIATION

Figure 3

formance against staff utilization for more accurate decision-making regarding the budgeting of manhours and ratios of categories of nursing personnel. The staff utilization index and the quality audit index can be graphed as shown in Figure 3 to illustrate trends and interrelationships. One test site hospital used standard staffing levels as the basis for manpower budgeting. Six months into the new fiscal year, manpower costs were reduced by over 2% although salaries and average daily census had both increased. Staff utilization for the entire hospital was maintained at 98-99 percent and nursing staff utilization averaged 98 percent. During this same period, quality of service improved and the quality index stabilized between 85 percent and 90 percent. Although not yet applied so extensively, the system has produced similar results in other hospitals. The authors feel that they have sound evidence that hospital quality and productivity can be improved simultaneously and that the described system is an effective tool for measuring and controlling the many variables involved.

Extension of the Systems to Other Institutions

Based upon the information and experience of these investigations, several educational activities were developed to promote more widespread use of the quality audit and staff utilization systems. A 32-hour *Staffing and Quality Audit Workshop* was designed and conducted to train systems analysts and management engineers in components of the system. A two-volume 500 page manual, a Nursing Quality Audit manual, several case studies, and audio-visual aids were developed and reproduced for this course. One session of the workshop has been conducted, and this program will become an integral part of future MED Systems Analysis Training Courses.

The section on Nursing Quality Audit has been presented to two groups of Directors of Nursing and will be made available for separate workshops to groups interested in developing or improving systems of nursing audit. Copies of the Nursing Quality Audit manual were distributed to all MHA member hospitals and nursing homes.

Conclusion

A system for monitoring quality of nursing care and staff utilization has been developed, tested and applied in Minnesota hospitals.

With proper installation and judicious maintenance, this system can provide the following benefits to all such institutions:

- Periodic control of quality and productivity.
- Evaluation of the interaction of quality and productivity.
- Improved cost effectiveness of health services.
- Accurate manpower scheduling and budgeting.
- Objective reimbursement based upon meas-

ured indices of quality and productivity.

Efforts to improve health care quality and productivity can be complementary, and can be undertaken simultaneously. The Minnesota Hospital Association will continue to provide manuals, workshops, and training programs to extend the use of this system.

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Patient Education in A Health Sciences Center

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THE CONCEPT of patient *rights* is not new. Even in the Fifth Century B.C. the Hippocratic oath included this idea. It is probably as old as the patient-physician relationship. What is new is the current controversial discussion by both lay and professional groups concerning the consumer's fundamental right to optimum health care and to participation in that care.

Responsibilities of the provider to the patient and of the patient as a member of the health care team are becoming more clearly defined. One result is the now widely accepted idea that the patient has the right to make an *informed* decision concerning participation in health care available to him. Health workers must be prepared to assist the patient to arrive at an informed decision. Since patients have a right to information, health workers have the responsibility for providing it.

It is generally accepted that a patient can participate in his own care and make meaningful decisions only if he has a complete understanding of the therapeutic program designed for his needs. However, one of the most conspicuous deficiencies in health care delivery has been the failure to provide adequate patient education programs.¹

This paper emphasizes the value of patient education programs in the care of the chronically ill. Such programs are equally valuable in health maintenance, prevention of disease and in control of acute illness.

Definition of Terms

In considering the patient's right to know, it is necessary to come to an understanding of terms.

Patient *information* means any communication

concerning the patient's interface with hospital or staff function of a nature more or less applicable to all patients.

Patient *instruction* means a communication to a patient or group of patients designed to deal with a particular problem. It usually consists of a transfer of a body of facts designed to provide basic understanding of a disease and of a therapeutic program. It is often informal.

Patient *education* means a structured, interdisciplinary program developed to meet the broad needs of an individual patient. It requires assessment of total patient needs, including an understanding of social, psychological, educational, socioeconomic, vocational and cultural characteristics of the individual. It includes assistance in the development of patient motivation and the initiation of behavioral change. Since cost-benefit considerations have become increasingly important, business administration skills should be utilized in the design and implementation of the program.

For the purposes of this study, the *patient* is defined as the consumer of health services in the hospital or clinic setting. The *whole patient* includes relationships to family, community, employer, and health care provider.

The ideal of optimum patient education requires individualized programs which enable each patient to accept and participate in a health care plan employing the best therapeutic efforts of all members of the health care team.² In the past most patient education programs fell far short of this goal and provided, at best, simple programs of patient instruction.

The Problem

Reliable methods for evaluation of patient education in the delivery of health services have not yet been developed. Peer review methods tend to be too broad and often lack objectivity. High quality health care in major centers has been largely assumed and subjectively expected, but rarely evaluated. Currently, studies are being con-

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ducted to develop objective methods for evaluation of quality health care. Measurement of patient understanding will result in increased interest in the design and evaluation of education programs as a vital component of patient management.

Patient education has carried a low priority within the total context of therapeutic programming, even when it was known that the patient with a chronic disease could not carry out effective self-care unless he clearly understood his role in the management of his disease.³ If *compliance* with instruction is accepted as the measure of the effectiveness of patient education, past efforts at communication were clearly ineffective. An extensive review of the literature in 1969 demonstrated that a range of from 15 to 93 percent of instructed patients were reportedly noncompliant.⁴ Recent studies of diabetes treatment show that acceptance and implementation of programs for self-care can be as low as 10 percent.⁵

The very rapid advances in scientific medical knowledge in recent decades often resulted in focusing attention on pathology rather than on the *patient as a person, suffering from a disease*. Educational emphasis is now broadened by inclusion of social and behavioral sciences in medical school studies, but "there continues to be a serious lack of actual consideration of these factors as they relate to patient education in the practice of medicine."⁶

Even with this broadened understanding, the patient's life situation seldom has been studied as a preliminary to planning. Very little attempt has been made to arrive at reliable individual patient assessment. Unless the patient's psychosocial, economic, educational and vocational profile is provided for the instructional team, the educational program cannot be tailored to the individual patient's needs. Difficulties in following the program then become insurmountable, and patient compliance suffers.

Realistic goals of therapy for the individual patient can only be set after careful consideration of the best approach in relation to individual capabilities. The degree of difficulty for the patient in implementation of the plan for self-care has been shown to affect directly the level of compliance.⁷

Since past patient-health professional communication constituted mere instruction, only the compulsive, well-motivated, intelligent, or deeply concerned patient achieved optimum self-care.

Increase of knowledge from well designed patient education programs has been demonstrated in a few studies. In at least one study, patient knowledge of the disease (diabetes) was inversely proportional to the degree of control of the disease.⁵ Could this mean that plans of therapy were inappropriate, that vital aspects of an education program were ignored, or that patients with the uncontrollable manifestations of the disease had stronger motivation to become better informed?

One problem in evaluating results of patient education is measurement of changes in behavior of the patient. Another is measurement of the reduction of morbidity and mortality through self-care. These desired outcomes are very difficult to assess. Measurements require long term observation of valid sample groups. Compilation of clinical data must be correlated with study of patient behavior in his life situation.

An increasingly important parameter of evaluation is reduction of cost of the delivery of health care by effective patient education. When reduced morbidity and mortality can be demonstrated as a result of patient education, cost reduction to the patient, his family, and the community can be assumed, but is still difficult to measure. One study discussed by Scott Simonds,⁶ was conducted at St. Peter's Hospital in New Brunswick, New Jersey. This study confirmed reduced hospitalization for congestive heart failure following patient education.⁸ Another study conducted at Los Angeles County Hospital demonstrated reduced morbidity of diabetes as a result of education and continuing support provided by a medical team.⁹ Other studies from Loma Linda, California, Dade County, Florida, and the University of Wisconsin have pointed to the same conclusion.

In analyzing traditional programs in order to eliminate past defects from new designs, it becomes apparent that it is important to assess the teaching skill of the professionals involved. The development of programs for patient education by health professionals other than physicians and nurses is an evolving process. Historically, the physician was the principal source of information and support for the patient in spite of the fact that training as an educator was not part of his background. A host of supportive skills now available from many other health specialists can be used to upgrade the education process. Skilled educators can plan with the interdisciplinary team

to implement more effective patient education. Time commitment by physicians can be reduced, while quality is increased.

The Plan of Action

The need to revise and strengthen patient education at the University of Minnesota Medical Center was identified in 1972. The philosophy of interdisciplinary cooperation accepted by the administration of Health Sciences and Allied Health resulted in planning for revision and expansion of patient education at the University of Minnesota Health Sciences Center. In this planning specific attention was given to the following areas:

1. Information gathering: Study of staff, patient load, patient need, quality of existing programs.
2. Interdisciplinary course development and evaluation of pilot courses planned in 1973 and available in 1973-74. Study of possible core curriculum for allied health disciplines.
3. Redesign of units of patient education, with interdisciplinary support being given in the design and evaluation of pilot education units developed in response to identified patient needs.

Information Gathering

The 1973 program and progress reported here was designed to collect data on:

- a. Present staff involvement in patient education.
- b. The Medical Center's patient population.
- c. Present programs in relation to generally accepted standards of excellence, including evaluation of staff.

A survey instrument was developed to obtain information on staff time directed to patient education, and to study preparation and attitudes of both students and staff. The groups to be studied included senior students in the Allied Health disciplines and sample staff groups in the Medical Center. Senior students in the Allied Health disciplines were surveyed in May, 1973. Staff surveying is scheduled to begin in July, 1973. These data will reveal the level of preparation for teaching as well as attitudes of students and staff toward patient education as part of total therapy in individual specialties. They will also reveal the percentage of time allocated to teaching by the various practicing health professionals.

Experience shows that all education is expensive in staff time. Most health care disciplines have some commitment to patient education but the exact amount of staff time expended has never been precisely tabulated. An estimation of the present commitment to patient education will provide a budgetary base for designing improved in-

terdisciplinary programs. Since the recent surge in hospital costs severely restricts funding of new programs, it is hoped that coordination of current staff commitments will permit development of improved programs without greatly increased budgetary support.

The survey will also evaluate attitudes toward, and preparation for, patient education by various types of personnel. In future patient education programs persons should be selected who have the skills and positive attitudes which enable them to function as educators.

More accurate information is needed to plan education programs and educational tools which suit the socioeconomic, educational, ethnic and cultural characteristics of the patient population being served. Under the leadership of the faculty in Health Education (School of Public Health) but still within the interdisciplinary framework, methods were developed for compiling information on the patient population in University of Minnesota hospitals. Much of this information is already being collected in some form in patient records, but development of a method for standardizing and compiling information from multiple sources required cooperation of hospital administration, the hospital admissions office, medical records personnel and the business office. Compilation of information by this method is scheduled to begin in September, 1973.

Evaluation of present programs in relation to generally accepted standards of excellence poses a difficult problem. The first effort is being directed toward *identification* of existing programs. Many of these programs are informal, often provided on a one-to-one basis, and not necessarily offered to every patient with a given diagnosis. As a consequence, a complete list of programs is difficult to obtain. Preliminary investigation showed that the only possible approach involves personal interviews with hospital staff personnel in all clinical areas.

The survey will be employed to identify those teachers who have participated in programs which meet accepted standards of excellence described in *A Model for Planning Patient Education*.² Collected information will be used to evaluate the quality of current patient education programs.

Interdisciplinary Course Development

The need to strengthen the preparation of health workers as patient educators was apparent after cursory analysis of curricula in Allied Health dis-

ciplines. Very few disciplines require appreciable basic academic course work in education, even in specialties where patient teaching is already considered a vital part of therapy (e.g. medicine, dental hygiene, dietetics, and nursing).

Two courses were designed to supplement the backgrounds of a wide variety of health specialists. The first, *Interdisciplinary Approach to Patient Care*, will be available 1973 fall quarter to junior and senior students in health disciplines. The second, also being planned on a cooperative basis, is *Problems in Patient Education*. Material and approaches included in these courses were selected with two purposes in mind: to supplement undergraduate preparation, and to strengthen backgrounds of the practicing professional. Both courses will also have value in programs of continuing education for health workers.

Redesign of Units of Patient Education as an Interdisciplinary Effort

Progress toward this objective must await completion of information gathering studies. Commitment of many disciplines to interdisciplinary patient education will require hard data as well as firm persuasion. This is a future objective which has not yet been approached.

The process of implementing change in a large institution is slow and difficult. The usual problems in achieving change involve facilitation of communication and effort through group process to reach a common goal. Although personnel in a complex organization tend to follow strong leadership from within their own peer group, they will act in response to administrative directives. Institution-wide planning for effective patient education will require deliberate support from hospital administration. Medical staff, allied health professionals and subprofessionals may be expected to participate in varying patterns, depending on the strength of program incentives. The new Health Sciences Center with its widespread support has the potential for stimulating academic programs and professional practice to be supportive of each other in working toward higher standards of excellence. The beneficiaries will be the patients, because of improved delivery of health care, and the health professional, because of

achievement of higher levels of competence

Summary and Discussion

Current interest in patient rights and responsibilities has accelerated reappraisal of the contribution of patient education to quality of health care. Evaluation of traditional patient education programs in hospital and clinic settings, when attempted at all, revealed marginal levels of patient understanding and compliance and passive patient role expectancies by health professionals.

Effective improvement of health care can be facilitated by patient participation as an active member of the health team. Evidence suggests that patient education programs can reduce morbidity and mortality when they take into consideration the multiplicity of facets of the life situation which affect each patient's therapeutic efforts. Higher quality of care and lower costs to both the patient and his community constitute rational and achievable objectives.

Plans have been completed for study of coordinated interdisciplinary patient education at the University of Minnesota Health Sciences Center. Health Science leadership groups are committed to developing innovative patient education programs with the realistic assumption that such efforts will improve the quality of health care. The need for objective evaluation of such programs is acknowledged.

A method of gathering data by surveying staff participation in patient education is developed and operational. Information on time allocation, attitudes, and level of preparation for teaching will be obtained.

A method for obtaining and compiling data on characteristics of the patient population has been designed. The direction of pilot programs for patient education will be obtained from this information retrieval system. Educational materials and multilevel approaches can only be developed when pertinent information is available.

The clearer understanding of problems in patient education will influence curriculum changes and plans for continuing education, in order that health professionals will achieve the competency required for this responsibility.

PATIENT EDUCATION PLANNING

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Peer Review of Patient Care in Nursing Homes

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IN THE FALL of 1971, Senator Moss of Utah chaired a session of the select subcommittee on Long Term Care. Many persons came forward to testify concerning the inadequacy of nursing home care.

Shortly, after this hearing the Board of Directors of the Minnesota Association of Health Care Facilities voted to restructure the ethics committee of the Association into a peer review committee. The function of this committee was to investigate the complaints brought before the Senate subcommittee to determine the extent of truth contained in the allegations.

The persons selected to serve on the first peer review team included administrators with a history of excellence in nursing home management and recognized leaders in the nursing profession. The teams were organized to include from three to four persons.

Because of the serious nature of the allegations made against many nursing homes, only one ground rule was established for these early surveys. If any indications of patient abuse or criminal neglect were found, the report would be turned over to the Minnesota Department of Health for legal action, and the home's membership in the Association would be terminated immediately.

During these pilot surveys many difficulties were experienced. Because the teams were not adequately trained, communication barriers arose between the surveyors and the staff members of the homes being surveyed. Due to the negative design of the survey checklist, only areas of deficiency could be highlighted. This led to frustration for team members as well as the homes

surveyed. The area that caused the greatest difficulty was the seeming inability to provide the home with what was needed to correct the deficiencies that were uncovered during the survey.

Even though these problems existed, the positive aspects of the peer review program far outweighed the negative aspects. The concept of self-policing and all of its possibilities, including its help-from-within potential, was a strong, driving force to keep the program going.

At this point a search of available literature was made to determine if a model peer review program for long term care facilities existed. Our search led us to the discovery that peer review was virtually untried in nursing homes.

This fact led the Association on a search for funding to develop a formally structured program of peer review.

The objectives of the program were as follows:

1. *To select and train survey teams. The teams were to be trained in survey techniques and communication skills.*
2. *Develop and print a survey instrument that would provide an accurate reflection of the care being delivered.*
3. *Locate and compile a listing of available consultants to assist in the correction of deficiencies.*
4. *Compile, print, and make available a library of written resource material to assist nursing homes in up-grading care.*
5. *Conduct surveys of nursing homes, provide necessary resources, and resurvey these homes at a later date to determine the extent to which this program could affect positive changes in the provision of nursing home care.*

Methodology

The selection of persons to serve on the peer review committee was made by the elected officers of the Association. The criteria for selection was experience in the profession of nursing home administration or nursing, history of accomplishment in Association activities, and a willingness

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to commit the time and energy necessary to accomplish the objectives of the program.

Two teams of four persons each plus two alternates were chosen to be trained. The training was conducted by experienced personnel from the Minnesota Department of Health, registered dietitians, nursing personnel from the Association, and communications specialists from the University of Minnesota.

The training was conducted over a two-day period. Topics included: survey techniques, health records organization, use of food thermometers and proper food serving techniques, and communication skills. The purpose for including the session on communication was to give the peer review teams additional confidence when meeting with the administrator and going over the results of the survey.

While this training was being planned and conducted, sample survey checklists were being collected from various agencies and organizations around the country. The best features of all the checklists were then put together. The form is reviewed after each survey in order to improve its effectiveness. If the review of the form warrants any changes, these are discussed at meetings of the peer review teams.

It became clear almost from the start that specialists in various health care disciplines would offer many advantages to the peer review program. Contact was established with the Minnesota Medical Association, the Consultant Dietitians Association, the Minnesota Medical Records Association, and the Minnesota Podiatry Association. The program was presented to liaison from these groups. On-call support for assistance was requested and received from each of these organizations. An important aspect of the program would be to develop a file of resource information that could be sent to the homes surveyed to help them correct any deficiencies.

Literature from many sources was sought. Job descriptions, procedure manuals, evaluation forms, health record systems, and safety plans are just a few examples of the types of resources sought. As the resources came in, they were categorized by subject matter. The teams then set about the time-consuming task of assembling and coding the information so that it could be retrieved when needed. This process is continuous as new and better information becomes available.

The survey team now trained, armed with a well-developed checklist and with the knowledge that they could assist the home to correct deficiencies, set out to prove the concept of peer review.

A general meeting of the Association members was held in May of 1972. Homes were asked to volunteer if they wished to participate in the survey process. Nearly 30 homes volunteered to take part. From these, 12 homes were selected to participate in the initial series of surveys. The homes were selected on the basis of type of ownership, size and location. Nine were proprietary and three were non-profit. Six were 70 beds or over and six under 70. Five were located in the metropolitan area and seven homes were located in rural areas or small towns. This mixture of facilities approximates the membership of the Minnesota Association of Health Care Facilities.

The two teams were assigned six homes apiece to survey. Upon the completion of the survey, the teams were to determine the types of resources or consultants needed to assist the homes and schedule the materials or persons as required. After the home received the necessary resource material and was given sufficient time to implement the necessary corrective action, the home was to be resurveyed. At least one member of the resurvey team was to have participated in the original survey of the home. This was done to provide continuity to the survey process but at the same time to avoid any prejudice that may have stemmed from the original survey.

Results

The results obtained from this original effort have surpassed all expectations. From a beginning of 10 trained surveyors the program has reached a stage where last March, 25 additional team members were trained as peer review surveyors. There are presently five teams of trained surveyors performing peer review in every geographical area in the state of Minnesota.

The survey checklist has been refined to the point that properly used, it gives an accurate picture of the care being delivered in the home.

A file has been developed of names of persons from various health disciplines available to offer consultant services to homes requiring such service. This consultation is available on a one-time or longer basis.

The library of written resources has expanded

and now occupies a five-drawer file cabinet at the Association office. The resources are divided into 17 categories from admission agreements to volunteer programs. This material is available to homes that may require it.

To date over 40 member homes totaling in excess of 4,000 nursing home beds have been surveyed. Twenty consultant visits have been made and written resource information has been sent to over 75 homes.

Because of the need uncovered during the surveys, eight seminars in Patient Care Planning, Charting and Documentation have been held. Over 300 nursing home nurses were in attendance at these seminars.

A series of five seminars on Medical Records and Utilization Review were conducted also as a result of the survey data. Over 250 nursing home personnel were in attendance at these sessions. This program was co-sponsored with the Minnesota Department of Health, and cost was underwritten by the regional office of HEW.

Discussion

Based on the homes surveyed to date, the care provided meets at least minimal standards and frequently exceeds this.

The area which is deficient is that of adequate, efficient documentation. Often an outside professional can offer tools to assist in this area. This seems to suggest the need to carefully evaluate the amount of regulatory documentation required in an effort to allow professionals to concern themselves directly with quality patient care rather than extensive paper work.

We also feel nurses in the long term care setting need additional skills to properly administer and supervise the numbers of non-professional workers in nursing homes. The Minnesota Association of Health Care Facilities HEW grant, to train inservice training coordinators, is an excellent beginning in an area that is definitely needed. It is our hope to expand upon this education and continue to meet the ever changing needs identified daily through new research and development.

Efforts must be made to assist some proprietary facilities to recruit and effectively use volunteers which are recognized as an asset to total care. Concerned citizens have much to offer.

A variety of interpretations by nursing home

surveyors throughout the state have apparently led to some inequities in the survey process. An effort will be made to work with our Health Department in an attempt to make the survey process as uniform as possible pertinent to a specific level of care.

The real plus of the peer review program in nursing homes is the positive efforts to upgrade and assist each other to provide total quality care for the elderly. We are pleased with the concern of many other interested organizations in Minnesota. We wish to acknowledge the concern of the Minnesota Health Department, the Minnesota State Medical Association, the Minnesota State Hospital Association, Conference on Geriatric Care the Joint Religious Legislative Council, the Minneapolis Age and Opportunity Center, Inc., the Select Subcommittee on nursing homes chaired by Mr. Flakne, and many citizens who actively support total quality care for those who reside in our nursing homes. The funded support of the Northlands Regional Medical Program demonstrates their concern.

Summary

During the past 17 months, 40 nursing homes with a total of 4,015 beds have been visited by the peer review teams of the Minnesota Association of Health Care Facilities. Once rapport was established with the administration of the homes, the surveys proved to be quite successful.

Salient problem areas have emerged from the vast accumulation of peer review data. The most frequently deficient category centers on lack of adequate documentation of services provided.

Results seem to indicate that many nurses, although well trained to provide direct care services, are poorly prepared for the increased administrative work load of the nursing home. There is also a genuine need to carefully evaluate the amount of regulatory paper work and documentation required in the nursing home.

The concept of peer review is a viable mechanism for determining the adequacy of care in nursing homes and can be a significant force in establishing the rightful role of the long term health care facility in the delivery of health services to the community.

Improving Rehabilitation through Continuing Medical Education

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MINNESOTA CONTAINS more rehabilitation services and centers than its surrounding states; however, these services are concentrated in the Metropolitan area and the larger urban areas of the State.¹ There is a need to extend the experience of these centers to outlying areas.²

In the early 1960's Dr. Miland Knapp started continuing education programs in rehabilitation services for physicians in Minnesota cities in the outstate areas under the auspices of the State Department of Health.^{3,4} These programs proved successful and expanded the use of rehabilitation services.

In an attempt to further this expansion, to increase the utilization of the facilities and personnel in smaller cities, and to share the latest information with more physicians, Northlands initiated a program to establish relationships between major rehabilitation centers and community medical resources which would provide consultation, education, or evaluation services to the communities. One of the programs established was a continuing education program presented to the medical staff of the Northfield City Hospital by a physiatrist, Dr. Lloyd T. Wood of the Department of Physical Medicine and Rehabilitation of the Mayo Clinic, Rochester, Minnesota.

The Northfield City Hospital is a municipal hospital in a city of over 10,000 population, located 49 miles northwest of Rochester and 27 miles south of the Twin Cities. The hospital has forty acute beds and a forty-bed convalescent unit. At the time of this study, there were eight general practitioners and an osteopathic physician

on the medical staff. The physical therapy department is large and well equipped, located on the ground floor of the convalescent unit with direct access to a parking lot. It is staffed by a registered physical therapist and an aide, and is open five mornings a week.

It was hypothesized for this study that a well-planned continuing education program for the medical staff would: (1) increase the utilization of physical therapy (P.T.) services; (2) change various characteristics of P.T. treatments; and (3) change the range of diagnoses of referred patients. This report describes the impact of the continuing education program on the use of P.T. services.

Method

After a year of preparation by members of Northlands staff, Dr. Wood and the medical staff of Northfield City Hospital met twice to formulate topics to be presented in the continuing education program. A series of six Monday evening programs were planned and conducted over a nine-month span starting in September, 1971. Topics included sports medicine, rheumatoid arthritis, diagnosis of cerebral vascular accidents, heat modalities and case presentations on such subjects as rehabilitation from fractures. Programs were presented by Dr. Wood and other specialists from the Mayo Clinic. Attendance was good and receptivity by the staff was enthusiastic.

Data on P.T. services were collected from patient records in the P.T. department, the hospital and the convalescent unit.

The study was divided into three parts, labeled Period I, Period II and Period III. The *pre-program component* was designated as Period I and covered twelve months, September 1, 1969 to August 31, 1970. Analysis of data collected *during the program* was designated as Period II

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and covered nine months, September 1, 1970 to May 31, 1971. Analysis continued for a six month *post-program period*, designated as Period III, to evaluate the persistence of any changes in utilization patterns. Because the three study periods varied in length of time, all comparisons were made by percentages of patients rather than numbers of patients.

The data supplied information on the patient's age, sex, primary and secondary diagnoses, physician prescription for P.T., discharge disposition, and length of hospital or convalescent unit stay. Utilizing a specially developed coding form and a five-digit patient identification numbering system, the data were transferred to punch cards and processed by computer. The patient location at the time of the referral to P.T. determined the designation of hospital patient, outpatient, or convalescent unit patient.

The percentages of hospital and convalescent unit patients receiving P.T. were calculated from the total number of institutionalized patients.

Results

Extent of Utilization of Physical Therapy Services

The total number of patients referred to P.T. did not increase. There was a slight increase in the percentage of total hospitalized patients who were referred for P.T. (from .9% to 1.6%) in Period II but this was counterbalanced by a corresponding decrease from Period II to Period III. There were no changes in the percentages of convalescent unit patients for whom P.T. was ordered.

The source of patient referrals changed. Table 1 shows a 15% increase in the proportion of P.T. patients coming from the hospital between Periods I and II and a 7% increase from Period I to Period III. It also shows an 11% decrease in the proportion of P.T. patients coming as outpatients from Period I to Period II. There was a 4% increase in convalescent unit patients from Period I to Period III.

TABLE 1
Proportions of Patients Receiving P.T. by
Source of Referral

	Total Number	Source of Referral		
		Hospital %	Outpatient %	Convalescent Unit %
I. Pre-Program	209	42	41	17
II. Program	176	57	30	14
III. Post-Program	93	49	29	22
TOTAL	476	49	35	17

Physician use of physical therapy department services changed. Patterns of utilization showed that during Period I, one cluster of physicians were high frequency utilizers of P.T., while another cluster of physicians were low frequency utilizers. It can be seen in Tables 2 and 3 that in relationship to each other high frequency physicians constituted a smaller source of all referrals and actually decreased their number of referrals in Period II and Period III by 24%. Low frequency physicians increased their utilization by 19% from Period I to Period III and provided a majority of referrals in Period III.

TABLE 2
Proportion of P.T. Referrals from Physician Clusters*

Physician Cluster	I. Pre-Program	II. Program	III. Post Program
High Frequency	59%	53%	35%
Low Frequency	39%	41%	58%

*Percentages do not total 100 since 2% to 6% of patient referrals for P.T. came from physicians who were not on the staff of Northfield City Hospital and did not participate in the continuing education program.

TABLE 3
Percentage Change of Referrals
from Physician Clusters

Physician Cluster	Period I to Period II	Period II to Period III	Period I to Period III
High Frequency	-6%	-17%	-24%
Low Frequency	+2%	+17%	+19%

Characteristics of Physical Therapy Treatments

1. The number of physical therapy visits per patient changed. P.T. services tend to cluster in three visit groupings since orders usually specify three treatments per week.

The greatest change occurred in convalescent unit patients. Data portrayed in Table 4 shows a general increase in the number of visits per patient from Periods I and II to Period III. Over 45% of patients received one to nine visits in Periods I and II but the proportion was reduced to 25% in Period III. Forty-five percent received 10-19 visits in Period III and 20% had 20-29 visits, resulting in 65% having between 10 and 29 visits. In Periods I and II less than one-third received 10-29 visits.

Orders for very long courses of P.T. treatment diminished. In Period I, 8% of convalescent unit patients received over 50 P.T. visits, compared to none in Periods II and III. In Period II, 14% received from 40-49 visits, compared to none in Period III.

TABLE 4

Percentages of Convalescent Unit P.T. Patients in each Study Period by Number of Visits per Patient

P.T. Visits per Patient	Study Period			N=78 %
	I N=36 %	II N=22 %	III N=20 %	
1-9	47	45	25	41
10-19	17	23	45	26
20-29	14	9	20	14
30-39	11	9	10	10
40-49	3	14	0	5
Over 50	8	0	0	4

The majority of *hospital* patients received from one to nine P.T. visits in Period I and this did not change significantly in Periods II and III. *Outpatients* showed no change in numbers of visits per patient except for a decrease in the percentage of patients receiving very long courses (over 39 visits) from 6% in Period I to none in Period II.

2. Physical therapy modalities utilized. Tables 5, 6 and 7 show the most frequently used P.T. modalities in each group for the three periods. Most common P.T. modalities differed among patients from different sources. Gait training was most frequent in institutionalized patients but uncommon among outpatients. Massage, exercise and whirlpool were common in all. Heat therapy was common in hospital patients and outpatients but not in convalescent patients. Evaluation and range of motion were common only in convalescent patients. Orders for exercise therapy increased in all patient groups from Period I to Period II and in hospital patients from Period II to Period III. There were no significant changes in other modalities except that massage decreased moderately in Periods II and III.

The educational program apparently produced little change in the use of the commonest P.T. modalities except for a definite increase in orders for exercise therapy.

TABLE 5

Numbers and Percentages of Most Common P.T. Modalities for Hospital Patients

Modality	I. Pre-Program		II. Program		III. Post-Program	
	N	%	N	%	N	%
Gait Training	40	29	45	30	21	33
Massage	20	15	21	14	6	9
Hydrocollator Packs	14	10	0	0	5	8
Whirlpool	12	9	11	7	0	0
Exercise	11	8	28	18	18	28
Shortwave Diathermy	11	8	22	14	4	6
Others	28	21	25	16	10	16
Total	136	100	152	99	64	100

3. Completion of physical therapy courses of treatment changed. In Period III the percentage of hospital patients who terminated P.T. because

TABLE 6

Numbers and Percentages of Most Common P.T. Modalities for Outpatients

Modality	I. Pre-Program		II. Program		III. Post-Program	
	N	%	N	%	N	%
Massage	37	24	26	24	8	16
Hydrocollator Packs	26	17	17	16	9	18
Whirlpool	19	12	16	15	0	0
Exercise	18	12	22	20	8	16
Ultrasound	31	20	13	12	9	18
Others	25	16	15	14	17	33
Total	156	101	109	101	51	101

TABLE 7

Numbers and Percentages of Most Common P.T. Modalities for Convalescent Unit Patients

Modality	I. Pre-Program		II. Program		III. Post-Program	
	N	%	N	%	N	%
Gait Training	19	31	20	56	15	31
Massage	6	10	1	3	2	4
Whirlpool	5	8	0	0	0	0
Exercise	13	21	15	42	9	19
Range of Motion	7	11	0	0	2	4
Evaluation	5	8	0	0	4	8
Others	6	10	0	0	16	33
Total	61	99	36	101	48	99

they were discharged home decreased. The percentage of hospital patients discharged home who were to continue as outpatients decreased also. At the same time the percentage of hospital patients who continued P.T. after transfer to the convalescent unit increased to a comparable degree (9%). Thus, more P.T. was completed during hospitalization or continued after transfer to the convalescent unit.

Convalescent unit patients who terminated P.T. while remaining in the convalescent unit increased by 15% in Period III. The percentage of P.T. patients transferred back into the hospital or to a nursing home decreased by 23%. Here too, there was a suggestion that ordered courses of P.T. were part of a consistent plan of treatment.

Average length of stay for P.T. patients in the hospital and in the convalescent unit did not change from Period I to Period III. Thus, the changes in P.T. observed were not associated with longer institutionalization.

Range of Diagnosis of Physical Therapy Patients

The frequency distribution of the top five primary diagnoses did not change materially during the three periods. The overall averages were as follows:

1. Sprains, strains, soft tissue trauma 23%
2. Fractures, lower extremities 19%
3. Cerebral vascular accidents 13%
4. Arthritis and osteoarthritis 8%
5. Osteoporosis 4%
6. Fourteen other diagnoses 33%

There were, however, several significant changes within the "other" diagnostic grouping.

Referrals with "no diagnosis" disappeared and "unclear diagnosis" dropped from 14% in Period I to 2% in Period III. New diagnoses included Parkinsonism, diabetes, cancer and emphysema in hospital patients; meniscectomy in hospital and outpatients; Bell's palsy in outpatients; and osteoarthritis and Parkinsonism in convalescent unit patients.

Discussion

The purpose of the continuing education program was to familiarize the physicians of Northfield with the latest information in the area of physical medicine and rehabilitation. It was hypothesized that the continuing education would increase the number of patients referred for P.T., that the number of physicians using the services would increase, that the kind of P.T. treatments given would change, and that the diagnoses of patients would change. All of these hypotheses were supported except the first.

Data analysis showed little change in the percentage of patients referred to P.T. from the total patient population in the hospital or in the convalescent unit. Outpatient referrals actually decreased. However, there was a shift in the proportion of P.T. referrals by patient source. A higher percentage of total referrals came from hospital and convalescent unit patients. Physicians were apparently more aware of P.T. services for institutionalized patients and completed the therapy before discharge to their homes.

A cluster of low frequency referring physicians of Period I apparently gained useful information from the continuing education and increased their referrals by 19%. The 24% decrease in the cluster of high frequency referring physicians was partially explained by the move of one high frequency referring physician from the community. The continuing education program could also have provided high frequency referring physicians information about more appropriate uses of P.T. and its periods of maximum effectiveness.

The duration and pattern of P.T. treatment orders remained essentially the same for hospital patients. Outpatients terminated treatments earlier, which suggests that the physicians saw P.T. as a form of treatment with a period of maximum effectiveness and that prolonged treatments were not efficient or effective. Convalescent unit patients also had therapy terminated earlier, yet at the same time a higher percentage received a

longer series of visits. This was a major change in the pattern of P.T. treatment visits and appeared to be a shift in the way physicians saw the rehabilitation potential of the older patients in the convalescent unit. This is particularly significant since all patients in the convalescent unit were over 65 years of age in Period III which was not true in Periods I or II.

Exercise is a major therapeutic tool of P.T. and a modality which requires the greatest expertise. Its use increased from Period I to Period II for all patient groups and from Period II to Period III for hospital patients. Even with the drop in percentage from Period II to Period III for convalescent unit patients, exercise was the second most frequently used modality. The increase in the use of exercise indicates that the physicians became more aware of its importance and effectiveness, and that they utilized the skills of the physical therapist to much greater advantage as a result of the continuing education program.

The changes in the patient disposition at discharge revealed a significant shift in the patterns of utilization. Fewer hospital patients receiving P.T. were discharged directly home while more were transferred to the convalescent unit. This suggests that patients went in the convalescent unit for more rehabilitative care which in turn, allowed them to be discharged home rather than to a nursing home or back to the hospital. The data showed that the percentage of convalescent unit patients who were transferred back to the hospital or placed in nursing homes decreased in Period III.

The addition of several new primary diagnoses in Period II suggests that the physicians learned of new ways in which P.T. could be used. The reduction of referrals which came with unclear diagnosis indicates that the physicians came to recognize the importance of the diagnosis in P.T. treatments.

The increased percentages of convalescent unit patients who received more P.T. visits, the increased percentages of the use of exercise, the decreased percentages of convalescent unit patients placed in nursing homes or transferred back to the hospital, and the increased percentages of hospital patients transferred into the convalescent unit point to a change in the physicians' concepts concerning the potential of older patients for re-

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ponse to P.T. These changes indicate that this was the most significant shift in the pattern of utilization of P.T.

Summary

A continuing education program in physical medicine and rehabilitation for the medical staff of a community hospital was effective in changing patterns of utilization and concepts of physicians

regarding patients' potential response to treatment, particularly for the older population group. Low frequency referring physicians increased their referrals and continued to do so after completion of the education program. Skills of physical therapists were utilized more effectively and physicians referred patients with different diagnoses for treatment, which also persisted into the post-program period.

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Automated Categorical Medical Audit in a Multispecialty Clinic

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CONSIDERABLE PRESSURES have been present for some time to develop performance standards for the physician in much the same way in which engine performance specifications have been developed for engineers and manufacturers. Those pressures have become sharply intensified by an inflationary economy and an increasing involvement of governmental monies in the provision of health care. The concern for how effectively the health dollar is being spent seems to have been focused primarily on the physician, the latter being the single most distinctly discernible member of the "health team." In truth, quality of care has been a vital concern of the medical professional ever since the 1850's when Virchow established the autopsy as the final diagnostic criterion.

It is also true that attempts to provide valid statistical analysis of patient care (beyond such analyses as are provided by birth, age and death figures) had to wait for the arrival of the computer. One of the most outstanding examples of the use of that instrument in the presentation of health care data is provided by the Professional Activity Study (PAS) and the Medical Audit Program (MAP) of the Commission on Professional and Hospital Activities of Ann Arbor, Michigan. While the presentation of data print-out in PAS and MAP does not provide of itself any assessment of care, it makes such assessment possible by comparing performance of record with performance as ideally defined. This "normative" post-hoc evaluation has obvious defects. It is not clear how to arrive at "norms" in diagnostic and therapeutic regimens and common ground often is found to be too limited to be useful. It is also a moot point whether the final benchmark of successful diagnosis and treatment, viz. outcome, is

affected by such studies. There is a real danger that such computer-based "normative" studies will tend to force the practitioner into non-think, practice-medicine-by-the-numbers situation. The logical extreme projection of an effective computerized quality review would be complete control of the practice of medicine by the computer. This has not been shown to be feasible.

To point out such limitations of the method is not to decry the value of audits of outpatient care. Ciocco et al.¹ studied clinical services provided to new patients in medical groups and were able to establish a relationship between performance and qualifications of the physicians involved. Makover² used the review of samples of medical records in the Health Insurance Plan of New York (HIP) to study care provided by member physicians. All of these studies, as well as those by Morehead,³ Lembeke⁴ and Payne,⁵ used evaluation of the process of care to study performance.

This study follows the same basic pattern of process review, but adds the services of an in-clinic computer. It also attempts to look at some of the economics of out-patient care. After being exposed to the PAS-MAP method as an audit tool in the hospital, it appeared worthwhile to explore the same concept in an outpatient multispecialty clinic setting. Out-patient care generally does not lend itself to computerized data gathering and analysis as readily as hospital care. Record keeping in the hospital is more detailed and diagnostic and therapeutic procedures are more extensive. There is a great need to develop methods for outpatient medical audit. The East Range Clinics since 1970-71 has recorded diagnoses (ICDA code) as well as Xray and laboratory procedures (ERC code) for each patient visit. The clinic computer (Honeywell 120) was primarily designed for accounting purposes. Careful programming, combined with physician education, allowed us to store and retrieve information which could be used in the evaluation of ambulatory

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health care services. Adaptation of the accounting computer to auditing functions depended primarily on programming, storage capacity, and full cooperation of physicians. The importance of the list can hardly be overemphasized if any computer-based analyses are to be meaningful.

Objectives

The objective of this demonstration project was to develop and test a system of out-patient medical audit in this multispecialty clinic which would: (1) provide analyses of the quality and cost of services, (2) Determine the quality of care given to patients, and (3) Develop improved patient care by medical staff education.

Methods

A Medical Audit Committee consisting of five members of the twenty-six man clinic staff was appointed to carry out this study. The committee, consisting of three internists, one obstetrician and one general surgeon, decided to choose ten of the commonest clinic diagnoses for this audit. As a preliminary step the computer department was asked to provide a list of the number of visits for the fifteen most common diagnoses in 1971. The computer analysis provided the following list in order of frequency:

1. Refractive Errors	4127
2. Hay Fever	2786
3. Other Viral Diseases	1915
4. Acute Pharyngitis	1847
5. Chronic Ischemic Heart Disease	1595
6. Other Eczema and Dermatitis	1487
7. Diabetes Mellitus	1396
8. Acute Nasopharyngitis	1331
9. Cystitis	1321
10. Essential Benign Hypertension	1190
11. Otitis Media	1175
12. Acute Tonsillitis	1202
13. Acute Bronchitis	974
14. Diseases of Sebaceous Glands	959
15. Asthma	865

In selecting the ten most common diagnoses for study, five of the above list were eliminated because meaningful performance criteria would be difficult to establish. Refractive Errors was eliminated for obvious reasons. Other Viral Diseases was thought to be too vague to allow analysis. Other Eczema and Dermatitis was eliminated on the same grounds. Diseases of Sebaceous Glands was considered too trivial for review. Acute Pharyngitis and Acute Nasopharyngitis were lumped together as one diagnosis. The revised

list of the ten most common diagnoses for study with the number of visits was as follows:

1. Acute Pharyngitis & Nasopharyngitis	3178
2. Hay Fever	2786
3. Chronic Ischemic Heart Disease	1595
* 4. Diabetes Mellitus	1396
* 5. Cystitis	1321
6. Acute Tonsillitis	1202
* 7. Essential Benign Hypertension	1190
* 8. Otitis Media	1175
* 9. Acute Bronchitis	974
* 10. Asthma	865

*Study results presented in this report.

On further study, the committee found Acute Tonsillitis, Acute Pharyngitis, and Acute Nasopharyngitis to be entities in which proper diagnosis and management could run the gamut from doing nothing to performing numerous tests and giving numerous medications. It was decided to drop these entities from the study. The study of Hay Fever is still in process at the time of this writing. The seven remaining diagnostic categories were reviewed completely and are reported here.

In order to provide analyses of the quantity and cost of services for these eight study diseases, the computer was programmed to provide data on the service and charges for all patients during 1971.

To determine the quality of care given to patients, the explicit-process method was used.⁶ The Medical Audit Committee developed criteria for minimum professional performance for each of the study diagnoses and estimated the percentage of cases which should show performance on the clinic record. Initially it was thought that non-computer input could be provided entirely by trained non-medical personnel. When this was tested by a series of duplicate runs, the need for physician evaluation of medical records was convincing. Professional review was necessary to interpret the variations in quality and method of recording by staff physicians. The final result was that about ten percent of the clinic records had to be reviewed by physicians. Methodology employed in this study constituted an initial effort at quality review and was therefore not as extensive as might be desired since considerably more is involved in patient care than reflected in the chosen criteria.

Since this out-patient audit was essentially a new venture, reference materials from other reports were not of much assistance. "Norms" of the Metropolitan Health Care Foundation⁷ were

available but not very helpful. The criteria in the "norms" were developed with a view to determine allowable reimbursements for diagnostic and therapeutic regimens while the concern of this study was whether minimum professional performance criteria were being met by members of the group. Criteria developed by B. C. Payne⁵ are hospital oriented and thus not readily applicable to this Clinic.

The Medical Audit Committee circulated written reports to all members of the clinic giving results of each component of the study. Thus individual clinic members were able to observe the relationship of performance data to the expected performance criteria established by the committee. This resulted in a self-evaluating effort on the part of physicians and represented a significant educational effort. Continuing education programs were presented regularly both at the clinic and at the Virginia Community Hospital based in part on the results of these audit studies.

Significant educational benefits occurred indirectly from the process itself. The five-member audit committee learned the process of setting criteria. As each diagnostic category came up for review, members of the committee would ask themselves and each other what constituted minimally adequate workup and minimally adequate management. Informal discussions among other members of the clinic also constituted a type of "Hawthorne effect"* of continuing education.

Results

Tables 1-7 show results of the audit studies. The columns entitled "Actual Data" show results of analyses of actual performance at the clinic. The columns entitled "Expected" show Performance Criteria percentages approved by the Medical Advisory Committee. Service data provide a profile of clinic services for study diagnoses during the entire year of 1971. Performance data show the extent to which the clinic functioned according to expected criteria. For the four chronic diseases there was an overall average of 2.7 visits per patient for the year, and 48.3% of patients were seen only once. For the three predominately acute diseases, visits per patient averaged 1.4 and 76%

*The phenomenon of independent behavioral or attitudinal improvement which occurs because a new study or demonstration has been initiated. It was originally described in industrial engineering research.⁶ In Medicine, clinical trial of a new therapeutic modality often produces a "Hawthorne Effect"—a benefit above and beyond that which is later determined to be the limit of specific response to the therapeutic agent.⁸

were seen only once. Charges for care of chronic diseases were somewhat higher than those for acute diseases, as might be expected from the lists of criteria of performance.

TABLE 1
Chronic Ischemic Heart Disease

	Actual Data	Expected
No. of Patients	447	
No. of Visits	1347	
Ave. Visits/Pt.	3.0	
One Visit Only	168 (37%)	
2-4 visits	188 (43%)	
5+ Visits	91 (20%)	
No. Hospitalized	85 (18%)	
Ave. Charges/Year	\$53.50	
Ave. Charge/Visit	\$17.50	
Performance Criteria:		
Complete H & P	98%	100%
EKG	82%	100%
Chol, G3 or SMA	77%	60%

TABLE 2
Diabetes Mellitus

	Actual Data	Expected
No. of Patients	519	100%
No. of Visits	1257	
Ave. Visits/Pt.	2.4	
One Visit Only	236 (45%)	
2-4 Visits	222 (43%)	
5+ Visits	61 (12%)	
No. Hospitalized	91 (17%)	
Ave. Charges/Year	\$42.57	
Ave. Charge/Visit	\$17.74	
Performance Criteria:		
Complete H & P	100%	100%
Follow-up B.S.	96%	100%
2 hr. p.p. or Glu. Tol	40%*	80%
Urinalysis	40%†	100%
Diet Rx	80%	100%

*Most diagnoses were previously established

†Most patients use Test-tape and physicians accept results

TABLE 3
Cystitis

	Actual Data	Expected
No. of Patients	735	
No. of Visits	1263	
Ave. Visits/Pt.	1.7	
One Visit Only	457 (62%)	
2-4 Visits	36 (5%)	
No. Hospitalized	38 (5%)	
Ave. Charges/Year	\$25.29	
Ave. Charge/Visit	\$14.88	
Performance Criteria:		
History	85%	100%
CVA Tenderness	77%	100%
IVP	*	40%
Urinalysis	92%	100%
Culture & Sens.	9%†	35%
Follow-up	32%	50%
Recurrent Disease	23%	20%

*Technical difficulties.

†Additional 5% had G.C. smear.

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TABLE 4
Essential Hypertension

	Actual Data	Expected
No. of Patients	580	
No. of Visits	1136	
Ave. Visits/Pt.	2.0	
One Visit Only	320 (55%)	
2-4 Visits	781 (39%)	
5+ Visits	35 (6%)	
No. Hospitalized	39 (7%)	
Ave. Charges/Year	\$35.12	
Ave. Charges/Visit	\$17.56	
Performance Criteria:		
History	90%	100%
Gen Px	85%	100%
BP 140/90	70%*	100%
Chest Xray	68%	100%
BUN/Creat.	33%	80%
B.S.	50%	80%
Na/K	32%	50%
Reno./I.V.P.	16%	75%
Low Na Diet	23%	100%
One Rx	52%	100%
2+ Rx	17%	30%

*Many patients were under control during entire year of 971.

TABLE 5
Otitis Media

	Actual Data	Expected
No. of Patients	875	
No. of Visits	1111	
Ave. Visits/Pt.	1.3	
One Visit Only	687 (89%)	
2-4 Visits	184 (21%)	
5+ Visits	4 (0.5%)	
No. Hospitalized	5 (0.5%)	
Ave. Charges/Year	\$13.24	
Ave. Charge/Visit	\$10.18	
Performance Criteria:		
History	91%	100%
Ear Px	89%	100%
Follow-up	25%	30%

TABLE 6
Asthma

	Actual	Expected
No. of Patients	151	
No. of Visits	836	
Ave. Visits/Pt.	5.5	
One Visit Only	95 (63%)	
2-4 Visits	29 (19%)	
5+ Visits	27 (18%)	
No. Hospitalized	13 (9%)	
Ave. Charges/Year	\$32.82	
Ave. Charge/Visit	\$ 5.97	
Performance Criteria:		
History	95%	100%
Px	90%	100%
Chest Xray	27%	40%
Skin tests	5%	10%
CBC	23%	90%
Urinalysis	15%	90%

TABLE 7
Acute Bronchitis

	Actual	Expected
No. of Patients	758	
No. of Visits	911	
Ave. Visits/Pt.	1.2	
One Visit Only	648 (85%)	
2-4 Visits	106 (14%)	
5+ Visits	4 (1%)	
No. Hospitalized	25 (3%)	
Ave. Charges/Year	\$20.30	
Ave. Charges/Visit	\$16.89	
Performance Criteria:		
History (mention of sputum)	26%	100%
Px	80%	100%
Chest Xray	37%	70%
CBC	39%	50%
Antibiotic Rx	72%	100%

Comparison of data with expected performance shows that in most instances the 26 physicians practice according to the estimated standards of the Audit Committee. Committee expectations were somewhat higher than actual performance for most criteria, paralleling experience of similar audit studies of hospitalized patients. Significant differences were demonstrated in diet prescriptions in Diabetes; Culture, Sensitivities and Follow-up in Cystitis; laboratory tests in Hypertension and Asthma; and History and Chest Xray in Acute Bronchitis.

Discussion

The greatest need pointed up by this study is the development of better record keeping. The out-patient record is notoriously sketchy. We are reorganizing clinic records and hope to use the computer to provide an on-going problem oriented list for posting appropriately on the chart.

It is not possible to determine the impact of this study quantitatively. Preliminary data suggest that the study has had some effect in improving clinic records, but definitive information will require repeat audits. It is our intent to repeat the review of the categories studied after a one to two year period. Physician interest and acceptance have been good. The reports of audit results for each diagnosis (distributed in letter form) produced lively discussions.

Cost analysis yielded some interesting figures. The out-patient management of chronic diseases such as chronic ischemic heart disease or diabetes mellitus has a physician related cost of \$40 to \$50 a year. Acute diseases with cure as the medical outcome objective, such as cystitis and otitis media, cost the patient between \$14 and \$25 for

each episode. This may approach the irreducible minimum in the management of the acute conditions, but increased use of home care conceivably could reduce the average number of annual clinic visits in the chronic diseases.

As to hospitalization, the average daily charge for hospital stay in Minneapolis at the end of March 1973 was \$117.52.⁹ Comparing this with the cost of ambulatory care, further attempts at expanding out-patient services appear to be in order. It seems likely that more frequent clinic and home care visits with closer control of chronic disease states could reduce the amount of hospitalization.

Certain inadequacies of computer evaluation have become apparent. These are primarily in aspects of diagnosis and treatment which are not readily amenable to codification. Such things as the recording of breath sounds or familial history of diabetes are beyond the present capabilities of our computer and may never be feasible or worthwhile.

It was found that while the computer had a definite place in audit of out-patient care: in determining incidence of disease categories, in reporting the quantity and costs of services, and in

the retrieval of appropriate charts. Detailed analysis of quality performance still depended on manual chart review. It is conceivable that more formalized record keeping could render audit more automated. However, it appears that the significantly fewer numerically identifiable indices render out-patient clinic practice less amenable to computer-based audit than hospital practice.

Summary

An effort to conduct a computer-based medical audit of the explicit-process type in a multispecialty out-patient clinic setting was successful to a degree. Criteria were set by a committee of staff physicians. The computer was found to be most valuable in determining incidence of disease categories and in retrieving services and cost data. Manual review of records, while still essential, was made manageable by use of the computer. Cost analysis in acute disease categories suggested that the outcome of "cure" was probably reached in minimum number of visits. The audit process lively staff interest in audit reports and audit-based continuing medical education sessions, provided mechanisms for improving the quality of patient care.

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An Outpatient Medical Audit

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THE MEDICAL AUDIT is an established method of comparing actual care as recorded in a patient's medical record to a group of standards developed independently. Comparing actual performance to preset standards can provide objective assessment of the "quality" of care provided. This process has been used extensively in the hospital setting. The major objective of this project was to develop a system of auditing outpatient medical records at the St. Louis Park Medical Center. It was hoped that the full medical audit cycle of demonstrating deviations and insufficiencies in a non-punitive manner would be educational for individual physicians and for the group as a whole.

Although evaluation of outpatient medical services by the medical audit process have been attempted previously, few published studies complete the full audit cycle within one organization where all physicians have mutual responsibilities to each other. The Commission for Professional and Hospital Activities has a limited outpatient medical audit which is best adapted to outpatient clinics of hospitals.¹ The National Ambulatory Medical Care Survey, a study in progress directed by Kerr L. White, is attempting to analyze ambulatory care visits from a sample of physicians from the entire country.² The University of Minnesota sponsored a conference in March, 1968, entitled "Outpatient Care Audit" in which programs at the University of Minnesota, Yale University, and St. Vincent's Hospital in New York were outlined.³ Many studies have been aimed at quality control of outpatient care, and some of these have used audit procedures in collecting information.⁴⁻⁷

The St. Louis Park Medical Center is a 75 physician multispecialty clinic serving over 200,-

000 patient visits per year and maintaining about 250,000 patient records. The records contain entries concerning ambulatory care and summaries of acute hospitalizations. With an obligation to provide quality care to this patient population, we felt it was important to develop some method of evaluating the effectiveness of the care provided.

The specific objectives of the audit project were: (1) to involve many clinic physicians in choosing diagnoses for study, in developing "Master Criteria" patterns and in setting *Expected Performance* standards of care, (2) to develop systems for chart abstracting and data processing, (3) to develop a manual to provide direction for non-physician auditors, (4) to use non-physician paramedical personnel as auditors for chart abstracting, (5) to make the audit detailed in scope, (6) to develop a statistical analysis to evaluate reliability and validity of the abstracting method by paramedical personnel, and (7) to integrate the audit into ongoing professional standards and educational programs at the Medical Center.

The outpatient audit, like many hospital audit processes, was a retrospective analysis by review and abstraction of clinical records at least three months after the initial patient visit. This conventional approach compares data recorded in the clinical record to a set of standards called "pattern criteria" for each specific diagnosis. A major difficulty with outpatient care evaluation is the multiple entries in the record which document patient services over a significant period of the patient's life. The record reflects the interaction of many disease processes and often excludes much of the data from hospital episodes of acute decompensation. Data recorded by many different persons show varying degrees of completeness and are loosely organized chronologically. The various types of data (e.g., laboratory, Xray, and visits to various departments) are inserted in separate sections of the record and present difficulties for coordination. Fortunately legibility was not a problem since most progress notes at this Center are typewritten.

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Methods

Twenty Study Diagnoses were chosen by requesting each of fourteen clinical departments to suggest three diagnoses to be evaluated. From this list twenty diagnoses were selected by the physician coordinators, which reflected the following characteristics: (1) crosses specialty and subspecialty lines, (2) includes all age groups, (3) includes medical and surgical problems, (4) includes acute and chronic illnesses, and (5) includes simple and complex problems. The list of the 20 selected diagnoses is as follows:

1. Hypertension
2. Diabetes mellitus
3. Duodenal ulcer
4. Iron deficiency anemia
5. Conjunctivitis
6. Carcinoma of the lung
7. Chronic sinusitis
8. Rheumatoid arthritis
9. Benign ovarian neoplasm
10. Pneumonia
11. Ulcerative colitis
12. Colle's fracture
13. Cystitis
14. Pyelonephritis
15. Corneal abrasion
16. Otitis media
17. Nontoxic nodular goiter
18. Depression
19. Asthma
20. Basal cell carcinoma

Pattern Criteria were developed for each of the 20 diagnoses. Two or three physicians on the Medical Center Staff were asked to list the optimal information that might be recorded for that diagnosis under the following categories: (1) historical information, (2) physical examination, (3) laboratory data, (4) therapy, and (5) followup. Physicians were specifically chosen to provide diversity of viewpoints (e.g., medical vs. surgical, adult vs. pediatric, general vs. specialized). A "Master Criteria" pattern was prepared for each diagnosis by physician coordinators after synthesizing the two or three individual pattern criteria. The process involved 51 clinic physicians and was accomplished without formal committee meetings; most communications were completed by memorandum. Once "Master Criteria" patterns had been developed, the broad limits of data to be abstracted from medical records could be defined.

A "Case Abstract Form" was constructed to allow tabulation of data in a form that could be easily transferred to punch cards and electronic data processing equipment. The data were grouped

in broad categories by history, physical, laboratory, therapy and followup. The total data abstracted from each patient record was contained on two standard 80 column punch cards.

An *Audit Manual* was prepared to aid non-physician personnel employed to abstract patient records. The manual explains coding of information such as physician, department, diagnosis, procedures, laboratory values and the "Master Criteria" patterns for each diagnosis. Paramedical personnel employed to do chart abstracting were all familiar with the organization of our medical records and record room procedures. Auditors included nurses, licensed practical nurses, medical assistants, receptionists, laboratory assistants and a premedical student. After initial indoctrination, each auditor abstracted several charts under direct observation of physician coordinators. Physician coordinators resolved all questionable items identified by auditors daily and checked each abstract for completeness. Patient records were collected by diagnosis so that auditors could review a single diagnosis for most of each abstracting session.

Monthly Printouts of I.D. numbers of all patients seen with each of the 20 diagnoses were obtained from the electronic data processing department during the first nine months of 1972. The charts were retrieved from the record room at least three months after the initial visit to allow adequate time for recording followup information and estimation of outcome. Abstracted data were transferred to punch cards, recorded on master tapes and processed by computer on a quarterly basis.

Quarterly Analyses were divided into three components: (1) individual reports to each physician having patients in the study series, (2) summary reports to each clinical department involved, and (3) summary reports for the Medical Center as a whole. Individual physician reports included a summary listing the physician's activity for the prior three months relating to the 20 diagnoses studied. It included all basic data: number of patients seen, types of evaluation, diagnostic findings, management and followup information. During the study three quarterly reports have been completed with letters of explanation to each physician and each clinical department.

Validity and Reliability of abstracted data was analyzed with assistance from the Biometry Division of the University of Minnesota Medical

school. One hundred charts were selected at random by a statistician from a computer printout of chart numbers in ascending order without respect to diagnosis. Seven charts had to be eliminated because they had been erroneously missed in the auditing process. The ninety-three records were reabstracted by the original nonphysician auditor and separately by one of the physician coordinators without knowledge of the original abstract or the other reabstract. The most important or "key" information for each specific diagnosis was selected for the testing process. The resulting three separately performed abstracts for the 93 records were compared as follows: Physician vs. Original; Physician vs. Reaudit; and Original vs. Reaudit. The total number of *Differences* (called "Errors") were listed for each chart, and all of the charts with the same diagnosis were summarized. Errors were subdivided for each of the key pieces of information to determine which kind of information was most often erroneously abstracted. More detailed analyses of Errors demonstrated: (1) the degree of difference in percent of history recorded, (2) Errors per chart and Errors per column for each diagnosis, (3) whether Errors were inherent defects in the design of the case abstract form or due to judgment inadequacy of the auditor, and (4) whether Errors were true omissions or due to recording of excess chart information which was not pertinent to the diagnosis.

Expected Performance standards for the whole Medical Center for each diagnosis were estimated by asking one "expert" Medical Center physician to state an "ideal" percentage of performance for each item in the abstracted information. In estimating "ideal" percentages the "expert" physician was asked to consider all known modifying interactions and circumstances in our outpatient setting. Expected performance percentages were compared with percentage calculations of actual performance for each diagnosis for the Medical Center as a whole and for each department where adequate numbers of patients with that diagnosis had been seen.

Results

Most of the objectives of this project were fulfilled. We were able to involve over 70% of the physician staff in active documented participation in the audit process. A chart abstracting mechanism was developed and nonphysician personnel functioned well in abstracting the data. Data proc-

essing programs and reporting mechanisms were developed and functioned well in the process of detailed outpatient medical audits.

One of the major objectives of this project was to determine the effectiveness of nonphysician personnel as the principal auditors in collecting and tabulating data from patient records. The reliability and validity portion of the study indicated that in areas where a subjective recording was required, there was more variation than in areas where only an objective measurement was recorded. The overall percent of Error for the 93 charts reabstracted is seen in Table 1. If the subjective estimate of percent of ideal history is not included, the percent of Error between the original abstraction and the reabstraction by the same person was only 10.5%, and the Error between original abstraction and physician abstraction was 15%. This means that the auditor agreed with himself or herself about 90% of the time and with the physician auditor about 85% of the time.

TABLE 1

Percentage Error in 93 Reabstracted Charts	
Overall Averages	
Physician vs. Original	16.8%
Physician vs. Reaudit	17.6%
Original vs. Reaudit	15.3%
Averages after Eliminating Subjective History Appraisal	
Physician vs. Original	15.0%
Physician vs. Reaudit	13.4%
Original vs. Reaudit	10.5%

Performance data on all patients with each of the 20 study diagnoses for the entire nine month period were tabulated by clinic department and for the Medical Center as a whole. Tables included the "Expected Performance" percentages for comparisons.

Table 2 presents the summaries of the data for chronic sinusitis. Twenty-four separate items constituted the "Master Criteria" in the management of this disease. The "Expected Performance" estimate is shown in the first column, and actual performance data appear in subsequent columns. Five items are highlighted for review because they varied most significantly from the expected. The validation study included seven cases with this diagnosis. Agreement between physician reaudit and nonphysician audit was better than the overall averages presented previously in Table 1.

The most consistent defect in all of the disease summaries was the lack of record concerning outcome. Those diseases that tend to be most chronic

TABLE 2
Percentage Performance Data by Department
Diagnosis: Chronic Sinusitis (No. of Cases in Parentheses)

"Master Criteria"	"Expected" Performance Percentages	Total Clinic (309)	Actual Performance Percentages					
			ENT (75)	Int Med (106)	Peds (13)	Allerg. (35)	Fam. Prac. (70)	Cardiol. (4)
ENT history recorded	100	94	97	91	100	91	96	100
> 50% of ideal history	100	28	16	30	31	40	19	25
Temperature not recorded	75	61	91	55	46	60	39	50
New workup 1972	—	67	64	72	15	60	66	100
ENT exam recorded	100	90	93	90	100	86	87	100
Hospitalized for diagnosis	5	5	9	5	0	9	0	0
WBC done	10	19	5	36	23	9	16	0
Differential done	10	17	5	33	23	9	10	0
Sinus x-rays done	100	25	40	26	8	23	11	50
Nasal culture	75	8	12	6	8	6	4	0
Throat culture	10	11	11	8	15	14	14	0
Sinus culture	5	1	1	1	15	0	0	0
Nasal smear for eosinophils	85	2	4	1	0	0	3	0
Skin tests	20	1	0	2	0	6	0	0
Antibiotics given	75	77	77	72	92	89	81	75
Decongestant (incl. antihist.)	85	71	61	75	46	83	73	75
Drainage or irrigation	10	2	4	1	0	6	1	0
Desensitization	10	1	0	3	0	3	0	0
Problem resolved	20	23	36	22	38	20	11	25
Controlled continuing problem	70	14	11	16	23	17	14	0
Uncontrolled continuing prob.	5	1	0	0	0	0	0	0
Outcome not recorded	5	64	53	62	38	63	70	75
Lost to followup	5	1	0	0	0	3	1	0
Refused followup	0	0	0	0	0	0	0	0

such as ulcerative colitis, rheumatoid arthritis, nontoxic nodular goiter, hypertension, duodenal ulcer, diabetes mellitus, depression, carcinoma of the lung, ovarian neoplasm, basal cell carcinoma, and asthma all had high percentages of outcome recorded. The more acute diagnoses such as conjunctivitis, corneal abrasion, cystitis, pyelonephritis, otitis media, and pneumonia had lower percentages of outcome recorded. The diagnosis of chronic sinusitis also had a high percentage of outcome not recorded, and it may be that our physicians are using this diagnosis in a way that doesn't fit our pattern criteria.

The large body of information on each of the diagnoses was made available to all physicians at the Center. Data analyses are being used by Medical and Paramedical Education Committees for continuing education programs. The Professional Standards Committee plans to continue using the audit system for an ongoing evaluation of professional activities at the Medical Center.

Summary

An outpatient medical audit system was developed and evaluated at the St. Louis Park Medical Center. Fifty-one of the 75 staff physicians participated in the project. During a nine-month period all patient records with any one of the twenty diagnoses being studied were retrieved for abstraction. A chart abstraction mechanism was developed using nonphysician personnel. A reliability and validity study was completed and indicated that the non-physician abstractors agreed with themselves 90% of the time and with a master audit performed by a physician 85% of the time. Physicians received quarterly reports of their activity with the 20 diagnoses under study. A summary of the data collected on each disease was compared to "expected" performance estimates. The audit information was made available to all Medical Center physicians, and the ongoing audit project is being integrated into the committee structure of the organization.

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Community-Based Health Education Councils

A Brave Venture

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JUST AS MANY pieces of legislation have had their origins in study commissions,[†] the Community-based Health Education concept can be traced to a special "Commission on Higher Education" which was created by the Carnegie Foundation. It was established out of concern for "... a shortage of professional health manpower, the need for expanding and restructuring the education of professional health personnel and the vital importance of adapting the education of health manpower to changes needed for an effective system of delivery of health care in the United States." In addition to the talent arrayed among its own membership, the Commission tapped a wide variety of other resources in the educational, health and public sectors. Its initial report¹ was published in October 1970.

A priority for health manpower coordination was also cited in the "Millis" report:² *"Initiate the organization of a local system of health science education and interdigitate that system with a regional system of health service."*

The Carnegie Commission Report cited many familiar problems and solutions. One particular recommendation—the establishment of 126 "Area Health Education Centers"—attracted a great deal of attention among educators and health providers. The Federal Government embraced the notion by providing grant and contract monies. An "Area Health Education Center" was seen as serving localities without a health science center, focused at a local hospital with its educational programs administered by a University Health Science Center. Training of medical and dental residents, continuing education for local practitioners and assistance to community colleges in

training health personnel were seen as its roles. Thus came the term "AHEC." Some educators and providers who agreed with the concept took a differing view on its implementation. Namely, that *the initiative should be taken at the community level* with groups of educators and providers organizing and requesting assistance from the Health Science Centers.

Two Federal Agencies became involved. The Bureau of Health Manpower embraced the "AHEC" approach with money contracted to Health Science Centers. The community-level approach was funded through Regional Medical Programs, with various titles attached to it in different regions. In Minnesota this effort became known as "Community-based Health Education Councils" or "CHEC's." Supplementing a special grant with local funds, Northlands RMP was able to start seven CHEC's on August 1st and two additional ones on October 1st of 1972.

Area Health Education Centers vs. Community Based Health Education Councils

The University of Minnesota is one of ten Universities who received an AHEC contract. It focused its attention on the area suggested in the Carnegie Commission Report—Central Minnesota. Its stated purpose is to "improve the distribution, supply, quality, utilization and efficiency of health personnel so as to bring into balance health manpower needs and resources." By coincidence this same area had been one of the first to establish a Community-based Council (CHEC). Result: The CHEC formalized its organization and became the contracting agency for many of the activities of the University of Minnesota AHEC in Central Minnesota.

One of Northlands 1972-73 Manpower projects was situated at St. Cloud State College (largest higher educational institution in Central Minnesota) for development of a "Physician's Assistant" program.³ As a precursor of the CHEC concept, the project specified a clear involvement of physi-

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†The legislation establishing Regional Medical Programs originated in a report by the President's Commission on Heart Disease, Cancer and Stroke (DeBakey Commission), December 1964.

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cians with the College in developing the new curriculum, and in providing assurance of future employment for graduates. The program hopes to enroll its first students in the fall of 1973.

The Concept of Community-Based Health Education Councils

The premise, if not the promise, of Community-based Health Education efforts is tied to such questions as:

- Is there any accountability of educational institutions: for the type and numbers of health personnel they produce? for the relevance of curricula?
- Do health providers have a responsibility to guide the production of health manpower in educational institutions according to health service needs? Do they want this responsibility?
- Who should provide necessary manpower for whom? where?—local, regional, state or national basis?
- Will local production favorably affect local supply and distribution?
- Do we need better continuing education for the personnel we have instead of continuing emphasis on producing new personnel?

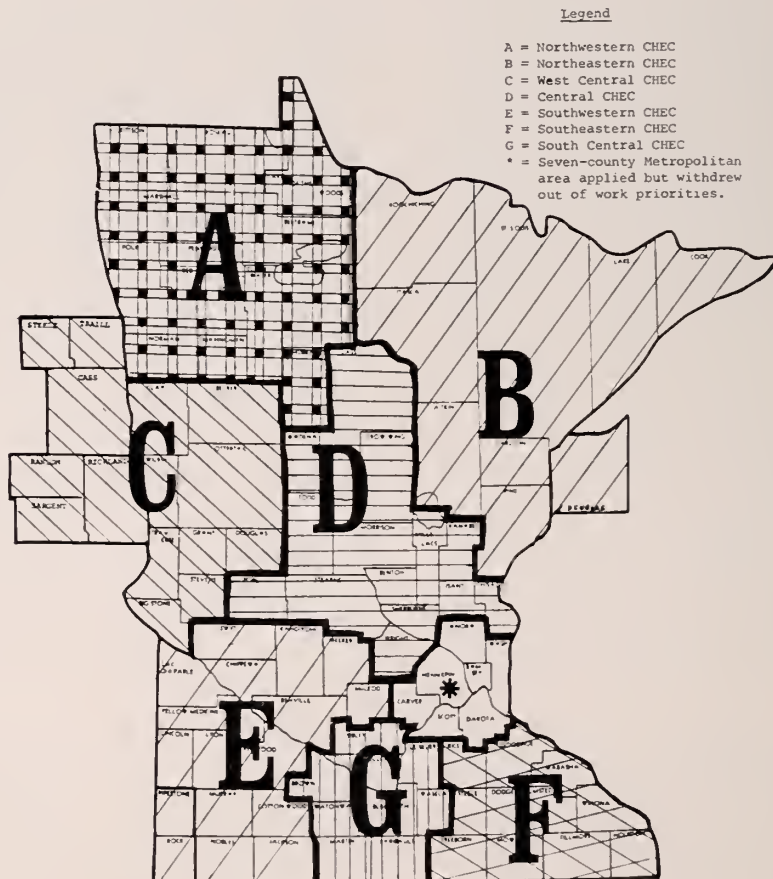
- Is there any payoff in educating the public in more effective use of the present health care system? the patients in better "self-care"?
- If the voice at the community level is amplified, will the Health Science Centers listen? respond?

The Approach in Minnesota

The Formula

Assist local leaders to get educational institutions and health care providers together in each region of the state. Create only *informal* structures. Facilitate communication in the hope it will lead to cooperation. Present the questions outlined above. Involve each group in its own assessment of needs and solutions, but in a context of "the whole." Provide modest funding, mainly for paid staff. Bring project directors (staff) together at regular intervals. Create a similar structure at each Medical Center in Minnesota to participate in all activities.

Because of its experience and modest success in bringing groups together to attack problems, Northlands RMP proceeded to accept the opportunity for special funding of this experiment in Minnesota. Some may even say we proceeded



Figure

with insufficient caution.

Territory

The defined "planning areas" of the State of Minnesota which are used by Comprehensive Health Planning (b) Agencies [CHP (b)] were accepted for CHEC development. The Figure shows the areas. Table 1 gives area characteristics. At the time the CHEC applications were being developed —

- Five of the planning areas were served by a funded CHP (b) agency with staff. One became the CHEC applicant (C); three gave active support to the development of the application by the CHEC group (A, B and D); one, the seven-county metropolitan area, applied and then withdrew because of higher priorities of its other work programs.
- Three of the planning areas were not funded or staffed as CHP(b) agencies (E, F and G), although two of these had applications for funds pending in Washington. The Southwestern CHEC (E) was organized under the aegis of a community-action group which had its origin in OEO. The Southeastern CHEC (F) was organized under an independent aegis but with participation and support by both the voluntary planning agency and Mayo Institutions; the South Central CHEC (G) was organized by a group that was also conducting discussions for organization of the CHP(b) agency. (It now appears that the CHEC group will give im-

petus to the development of a regional commission and CHP(b) agency.)

Initial Organization

Working with local leaders in each area, NRMP assisted by inviting representatives from educational institutions, health institutions and professional groups to attend informational meetings. Some came out of curiosity, some out of protectiveness of their own interests, some because they heard money was available and perhaps some because they anticipated an opportunity to give their area a stronger voice in health manpower production in the state. Whatever the reason, most kept coming and were willing to join their local colleagues in developing a funding application in March 1972. Each CHEC formed a "governing council" of interested institutions in the area, as shown in Table 2.

Unlike many other grant processes, funding was almost "instant." A special national grant supplemented by NRMP developmental funds permitted funding of all CHEC projects within three months of application. Included were the two Medical Center "resource groups"—the Mayo Institutions and the University of Minnesota Health Sciences Center.

Coordination

The NRMP Central Office staff employed a number of techniques to spirit continued meetings of these new groups and to foster communication and cooperation. Emphasis on local responsibility and assistance to the local project director were

TABLE 1
Characteristics of Minnesota CHEC'S

				Facilities			Status of CHP (b) Agency	
Area/Central Office		Counties Served	Population Served	Higher Educ. Inst.	Tech. Schools	Hosp.		
A	Northwestern Bemidji	Mn.	12	149,173	3	3	15	AGASSIZ Organized/Staffed
B	Northeastern Duluth	Mn.	8	346,424	8	2	20	ARCH
		Wis.	1	44,637				Organized/Staffed
C	West Central Moorhead	Mn.	9	182,210	7	4	22	MIN-DAK
		N.D.	6	118,101				Organized/Staffed
D	Central St. Cloud	Mn.	14	357,779	4	5	26	CENTRAL Organized/Staffed
E	Southwestern Marshall	Mn.	17	293,560	3	5	34	SOUTHWESTERN Organized/Applied for CHP funds
F	Southeastern Winona	Mn.	11	383,369	8	5	11	SOUTHEASTERN Organized/Applied for CHP funds
G	South Central Mankato	Mn.	9	218,077	3	1	17	SOUTH CENTRAL Not Organized Not Staffed
Totals:			88	2,093,366	36	25	143	

TABLE 2
Representation on Community-Based Health Education Councils

Area/Central Office	Educational Institutions			Health Providers			
	Sr. Col. or Univ.	Jr. Col.	Vol.-Tech. Inst.	Hosp./ Nsg. Home	Med. Soc.	Others	Public
A Northwestern Bemidji	1	2	3	3	4	8	1
B Northeastern Duluth	3	5	2	7	3	2	3
C West Central Moorhead	7	1	4	9	3	4	1
D Central St Cloud	3	1	1	3	1	1	1
E Southwestern Marshall	1	2	0	3	0	4	5
F Southeastern Winona	2	1	1	2	0	2	2
G South Central Mankato	4	1	2	5	2	4	3

important keys. Field visits by NRMP staff assisted in "trouble shooting." Regular meetings of the nine project directors at NRMP offices provided accountability for each group, but also gave each a perspective of "the whole."

What Did CHEC's Accomplish?

The emphasis in the first year of CHEC activities was necessarily on planning and development. In fact, the funding award required this emphasis rather than starting activities, perhaps traditional ones, without first clarifying a need. Activities of the CHEC's will be described in five sections: Organization, Problem Solving, Major Activity, Continuance and Highlights.

Organization

Bringing the right mixture of educators, providers and public members together. Despite their common need in producing the right person for the right job, many of these key people had never met each other. Working together in a specific organizational setting with CHEC-type goals was without precedent in all seven of the geographic areas.

Problem Solving

The emphasis was on confronting local problems in health manpower education—new manpower, education for existing manpower and public education in health. The intent was to seek appropriate solutions, either within the area or by using other resources. This activity also acted as an organizational stabilizer because of its emphasis on local involvement with local problems.

Major Activity

Each of the seven Community-based groups embarked on some form of assessing local needs

in health manpower education. A common survey form was developed but modified for the local situation in all seven areas, either in format or technique of administration. Completion before July 31, 1973 was an original objective which will be met by each CHEC. The results will give each CHEC a base for planning educational programs. Hopefully, it will also help justify the costs of producing such programs.

Continuance

All of the CHEC's plan to continue operation and have survived the challenges common to young, untested organizations—of travel to meetings, often over great distances; of threat to independent action; of accountability to a responsible group; and of developing a sense of purpose beyond the rhetoric of the initial plan. The toughest challenge is yet to come, but all are enthusiastic about meeting it—to continue the organization with staff after the termination of NRMP funding on August 31, 1973.

Some Highlights

Organization and activities crossed over State boundaries—

Six counties in North Dakota are part of the Min-Dak CHEC. Programs have been developed in educational institutions in *each* State which will serve health personnel in *both* States.

The Northeastern Minnesota CHEC includes Northwestern Wisconsin counties and Superior State University of Wisconsin. It has developed a master plan for educational programs in the health occupations which will involve educational institutions and providers in both States.

Educational programs have resulted from improved communication of need between providers

and educators—

A training course for nurses aides is being developed by Moorhead Area Technical Institute for St. Ansgar Hospital, Moorhead.

A ward clerk training program at Mankato Vocational Technical Institute has been developed for the health care institutions in South Central Minnesota.

The Central Minnesota CHEC, as part of the University AHEC program, has developed several new educational programs for allied health personnel; an exchange program between hospitals for regional laboratory services; and two "Tele-lecture" series for nurses.

Moorhead State College (Minnesota) is developing a program to permit nurses in the Minnesota-North Dakota area to acquire credits toward a degree while continuing employment.

The Medical Centers have become "involved"—

Improved communication and cooperation between University of Minnesota Health Sciences Center and Mayo Institutions have resulted from this project and is readily acknowledged by both organizations.

Departments within the Medical Centers have become involved in the development of continuing education programs for use by the CHEC's.

The Centers (usually together) have had continuous contact with the seven Community-based groups, and intend to continue it.

University Health Sciences Center will produce a brochure which will list in one place for the first time and for general distribution to health professionals—a consolidated list of continuing education opportunities via the University of Minnesota.

Discussion and Summary

Are the CHEC's important to anyone but the relatively few who are involved in the projects?

What will happen to the interest level of those involved if the surveys and interpretations do not rationalize "more of same" in manpower production?

At the point of writing this article, the "jury is still out" on these and other questions. However, there is this evidence of CHEC's importance in the eyes of others:

1. A special task force for the State Comprehensive Health Planning Agency in a study independent of (but concurrent with) the first year of CHEC's, recommended that "regionally based consortia of educational institutions, providers and public members should be established to provide local accountability and to provide review and comment upon proposals for the new health manpower programs from that area." This recommendation did not get discussion in the 1973 Minnesota legislative session, but may receive later consideration.

The Higher Education Coordinating Commission of Minnesota, which reviews and recommends new programs and curricula for educational institutions, recently asked the Northwestern Minnesota CHEC for review and comment on two competitive proposals to establish a new nursing program in that area.

2. The CHP(b) agencies have recognized the importance of a constituent group like a CHEC giving special attention to the problems of health manpower education and training. Working relationships between the CHP(b) agency and the CHEC's have been compatible during the first year. The "separate but related" premise of the CHEC may be key and could be jeopardized by discontinuance of outside funding.
3. At least one test of viability and enthusiasm is the ability of a CHEC to find other sources of support. At this writing, six of the CHEC's have firm plans for continuation of staff after the termination of NRMP funding on August 31, 1973. The remaining three are optimistic about obtaining funding or other means of continuance by September 1st.

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Profiles of Medical Practice

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MANY FORCES are operating to change the practice of medicine. But there is a dearth of quantitative data. Current social imperatives to increase the quality and accessibility of health care services prompted this study of medical practice in Minnesota today. It endeavored to describe quantitative characteristics of the professional activities of practicing physicians, making comparisons by type of practice and by medical specialty.

The questionnaire survey methodology followed the pattern set by the Center for Health Services Research and Development of the AMA in "Periodic Survey of Physicians" studies conducted since 1965.¹ This investigation was more extensive than those carried out by the AMA.

In March, 1972, questionnaires were sent to all 3,711 Minnesota physicians classified by the AMA as 020—primary professional activity in direct-patient-care (physicians enrolled in graduate medical education were excluded). Of a total of 1,878 questionnaires returned by July, 1972 (51%), 373 were eliminated because of retirement, out-of-state migration, data deficiencies, or classification errors. After adjustments, the 1,505 respondents represented a 44% study sample of Minnesota's 3,383 direct-patient-care physicians. Response rates for subgroups by specialty varied from 18% for Radiologists to 68% for Pathologists, but most others approximated the overall average of 44%.

Many physicians did not answer all of the questions. In some cases it was stated, or could easily be inferred, that the items were not appropriate to his type of work; in others the lack of response can only be a matter of conjecture. A few answers were eliminated from analysis by the study team because they were inappropriate and

obviously due to a misunderstanding by the respondent. Although the 382 staff physicians classified as 020 at the Mayo Clinic participated in the study, many of the questions were omitted because they were not equally applicable to this institution. Mayo data, although not identified as such, are included in sections I, III, and X to XIV of this report.

Computer analysis displayed the number of physicians answering each question, the range of responses, the mean values, and the standard deviations from the mean; it also subdivided the data by type of practice and by specialty. Whenever possible, comparisons were made with national data from AMA profile studies.

General Work Characteristics

Overall averages of general work characteristics for the 1,505 physicians in the study group are shown in Table 1. Compared with 1970 national averages, Minnesota physicians worked 7% more hours and saw 9% more patients, but spent slightly fewer hours in direct patient care and worked about one week less per year. In-hospital work constituted only 35% of the average Minnesota physician's time. The 37% of responding physicians who indicated more than one specialty spent 27% of their time in the secondary specialty,

TABLE I
General Characteristics

	N*	Mean	Nat'l Mean ¹
1. Hours/Week	1469	54.9	51.4
2. Weeks/Year	1446	47.0	48.0
3. Patient-care Hours/Wk.	1421	43.5	44.7
4. Physician Office Visits/Week†	802	104.4	95.5
5. % of Total Time in:			
a. Hospital Activities	1466	35%	
Out of Hospital Act.		54%	
Other Activities		10%	
b. Primary Specialty	520	70%	
(if more than one)			
Secondary Specialty		27%	
c. Tertiary Specialty	115	13%	
d. Office Practice	1423	56%	

*N equals number of physicians responding to each question.

†Does not include Mayo Clinic Physicians. Means are for patients personally seen by physician.

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and the 8% who indicated a tertiary specialty devoted 13% time to that field. Additional tabulations indicated that the Minnesota physicians worked an average of 10.3 hours per day 5.34 days per week, spent 5.7 hours per day in the office, and devoted an average of 15 minutes per visit to the average of 24 visits per day.

Characteristics of Office Practice

Table 2 shows six groups of characteristics of the office practices of all physicians in the study group except Mayo physicians. It may be inferred from the data that 19% of office services were delegated to employed assistants since only 81% of patients were personally seen. Medical and pediatric-type patients occupied 63% of the physician's time, and 23% of time was spent on well-person examinations. Although only 12% of the Minnesota population is over 65, 28% of physicians' time was spent on this subgroup. The total number of laboratory, Xray, and EKG tests per week almost equaled the total number of visits, and three-fourths of all tests were completed in the physician's office. The remarkably large volume of these tests can be better appreciated by calculation of grand totals for the 737 responding physicians—nearly 90,000 tests per week, of which over 21,000 (23%) were sent out of the office. The average Minnesota physician conducted 5,735 tests per year in his office practice.

The 2.3 employees per physician fall into three subgroups—nurses 0.65, technicians 0.42 and secretary-receptionist-others 1.23. RN and LPN nurses were employed in approximately equal numbers. Compared to national averages, Minnesota physicians employed about one-third more assistants—the same number of nurses, twice as many technicians, and one-third more other employees.

Few physicians responded to a question concerning the need for additional employees. Only 85 employment opportunities were reported, including 18 specifically identified positions for specially trained nurse or ex-corpsman assistants.

Delegation to Staff Assistants

To define more precisely the kind of patient care work delegated to staff assistants, physicians were asked to estimate the degree of delegation (< 50%, > 50%, 100%, or none) for 16 office services. Table 3 shows mean percentages of phy-

TABLE 2
Characteristics of Office Practice

	N	Mean	Nat'l Mean ¹
I. Patient Visits			
a. Total No./Week	834	129	
b. % Personally Seen	802	81%	
II. % Time by Patient Class.	851		
a. Medical		45%	
b. Pediatric		18%	
c. OB-G		13%	
d. Surgical		22%	
III. % Time by Service Type	873		
a. Well Person Exam.		23%	
b. Acute Episodic		37%	
c. Chronic Disease		38%	
IV. % Time for Patients over Age 65	897	28%	
V. Lab., X-ray & EKG Tests	737		
a. Total No./Wk.		122	
b. % Completed in Office		76%	
c. No./Office Visit		0.94	
VI. Employees/physician	916		
a. RN		0.28	0.26
b. LPN		0.23	0.10
c. Other Nurses		0.14	0.30
d. Lab Tec.		0.28	0.19
e. X-ray Tec.		0.11	
f. Other Tec.		0.03	
g. Secretaries		0.52	0.23
h. Receptionists		0.35	0.46
i. All-purpose Aids		0.30	0.20
j. Physician Assistants		0.06	
k. Total		2.28	1.73

TABLE 3
Percent of Physicians Delegating To Some Degree

	N	Mean %
1. Accounts—Billing	1303	98
2. Insurance—Other Forms	1305	98
3. Telephone Advice	1284	42
4. Routine Histories	1273	53
5. Injections	1258	81
6. Dressings	1219	76
7. Sewing Cuts	1191	8
8. Removing Stitches	1199	25
9. Applying Casts	1134	42
10. Removing Casts	1126	58
11. Well-person Exams	1176	43
12. Follow-up for simple:		
a. Chronic Illness	1211	43
b. Acute Illness	1212	39
13. Home Visits	1175	40
14. Nursing Home Visits	1176	6
15. Hospital Visits	1221	4

sicians who delegate to *some* degree. Although 100% delegation was reported by some physicians for each kind of service, the only service with 100% delegation by a majority of physicians was accounts and billing. In addition, 37% reported 100% delegation for insurance and other forms, 22% for injections, 9% for routine dressings and taking off casts, and 3% for physicals on well

persons and taking routine histories.

The high rate of response to this section suggests a great deal of interest in this subject, and the numbers indicate that Minnesota physicians now delegate parts of their work to a significant degree. Differences between the principal specialties will be discussed in later sections.

Characteristics of Hospital Practice

Virtually all physicians in Minnesota hold hospital privileges, and those in this study group indicated that 35% of their time was spent in hospital work. Table 4 shows seven parameters of hospital practice.

A high degree of physician referral is reflected by the 712 responses (63% of sample) and the mean of 32% of referred patients. Thirty-one percent of the study group indicated they do deliveries; 36% that they do major surgery; 48% that they do minor surgery; and 37% that they do surgical assistance. On the average, physicians engaging in these services did significant numbers of procedures each year.

TABLE 4
Characteristics of Hospital Practice

	N	Mean
1. Average Weekly Case Load	888	12.3
2. Number Admissions Last Year	795	285
3. % Patients Referred by M.D.	712	32%
4. If you do them, give number last year of:		
a. Deliveries	345	59
b. Major Surgicals	407	118
c. Minor Surgicals	544	88
d. Surgical Assistance	419	43

Characteristics of Nursing Home Practice

The average nursing home case load for 748 respondents (67% of study group) was 17.1. GP-FP and IM physicians carried approximately equal individual case loads and 88% of the total calculated case load; GP-FP physicians alone carried 70% of the total case load. The frequency of nursing home visits varied widely among individual physicians from weekly to once every six months. The overall average was one visit every 8.8 weeks. Sixty-six percent of 518 respondents (46% of study group) indicated that they would delegate work to a Geriatric Nurse Practitioner if one was on duty in the nursing home.

Home, Nursing Home and After-Hours Visits

Questions concerning numbers of these visits per week elicited responses from 69 to 74% of the study group. There was an overall average of

12 visits per week—2.2 home visits, 4.8 nursing home visits, and 5.5 after-hours visits. Primary physicians made 72% of all reported visits, 60% of which were made by the GP-FP group alone. The latter group averaged three visits per working day.

Professional Fees, Income and Expenses

Table 5 shows overall average responses to specific inquiries concerning the economics of medical practice. Response rates varied from 40% for the dollar value of one unit of the Relative Value Index to 78% for using the RVI to some degree. Comparisons with AMA data showed that Minnesota minimum office and routine hospital visit fees (1971) were moderately less than the 1969 national averages but slightly higher than those for the West North Central geographic area. However, professional expenses were significantly higher: 28% higher than the national average and 16% higher than that for the West North Central area.

When the net income and expense items are divided by hours worked per year, Minnesota physicians in the study group averaged \$15.29 per hour (net) and an overhead of \$10.48 per hour.

TABLE 5
Economics of Medical Practice

	N	Mean ¹
1. Usual Charges		
a. Minimum Office Visit	674	\$ 7.34
b. Complete Exam.	637	\$22.89
c. Routine Hospital Visit	652	\$ 7.72
d. Routine Home Visit	528	\$12.20
2. Mn. Relative Value Index		
a. % using—some degree	878	63%
b. Dollar value: one unit	451	\$ 6.60
3. Third-party payment		
a. Hospital Services		
(1) % Third party	860	75%
(2) % of Third party by Medicare-Medicaid	809	34%
b. Office Services		
(1) % Third party	779	37%
(2) % of Third party by Medicare-Medicaid	685	30%
4. Free & Discounted Services		
a. % Free Services	670	5%
b. % Discounted Services	590	8%
c. Average % discount	536	32%
5. Average Annual Expenses	634	27,085
6. Average Annual Net Income	703	39,518
7. National Average Expenses*		21,225
8. National Average Net Income*		39,727
9. West North Central Average Expenses*		23,431
10. West North Central Average Net Income*		41,288

*Most recent data available was for 1969¹.

Although only 19% of physicians reported following the Minnesota Relative Value Index completely, 63% used it to some degree. Third-party payors covered a large percentage of both hospital and office services. An overall average of 13% of all physician services were donated free or discounted for poor patients.

Comparisons by Type of Practice

Comparison of Solo practitioners, Partnerships, Groups, and Institutionally-based-physicians showed some significant differences. An obvious difference was a higher value for institutional-type services by institutional physicians. The most noteworthy differences which were observed related to the larger service loads carried by partnership physicians. Compared with overall averages, partnership physicians worked 2.6 more hours per week, 0.6 more weeks per year, and had 16% more office visits, 41% more home visits, 96% more nursing home visits, 13% more hospital admissions, and 11% higher net income. National data (1969-1970) on working time, patient visits, and income for partnership physicians are very close to the 1971 Minnesota data both grossly and relative to other types of practice.

The data for solo physicians are close to overall averages except that they worked about one more week per year and did 22% less laboratory, Xray, and EKG work in their offices. The number of tests sent out was about the same as that of other physicians. The smaller number of tests performed in the offices was matched by a correspondingly smaller number of tests per office visit.

The data for group physicians are similar to overall averages except that these physicians reported a little more time off, more delegation of work to assistants, moderately higher expenses, and slightly higher net incomes.

General Practice and Family Practice

Although this subgroup makes up only 26% of all physicians in Minnesota, it constitutes 32% of *patient-care* physicians and 37% of this study group. Because of the large size of the GP-FP group, average data were compared with averages for the combination of all *other* specialties, rather than the average for all physicians. Comparisons showed that GP-FP physicians worked 133 more hours per year (5%), had 61% more office visits per week, did 57% more laboratory, Xray, and

EKG tests per week, admitted 24% more patients to the hospital, carried a nursing home case load 1.5 times larger, made over twice as many home, nursing home, and after-hour visits per week, and employed 13% more office help.

Although GP-FP physicians made up only 37% of all physicians in the study group, they did more hospital admissions, deliveries, surgical assistance and nursing home care than their proportionate amounts. As shown in Table 6, the 67% of them who reported doing deliveries did 59% of all deliveries reported from the entire study group. The 39% who reported doing major surgery did 15% of all reported cases.

TABLE 6
GP-FP Services

	% of GP-FP's Answering Question	% of Total Reported Services by GP-FP's
Hospital Case Load	92	35
Hospital Admissions	80	47
Deliveries	67	59
Major Surgery	39	15
Minor Surgery	67	38
Surgical Assistance	65	63
Nursing Home Case Load	86	70

Reported charges by GP-FP physicians were 25% lower than the average of all *other* physicians for minimum office calls, routine hospital visits, and routine home visits. Professional expenses averaged 26% higher, gross income 7.5% lower, and net income 27% lower.

Compared to national averages for GP-FP physicians, average charges for minimum office calls were 2.4% lower; charges for routine hospital visits were 16% lower; professional expenses were 28% higher; and net income was 6.9% lower.

Internal Medicine

Internists made up 12.5% of all patient-care physicians and 12.9% of the study group. Although most Internists function as primary physicians, Table 7 shows that many items in the profile of practice differ significantly from the GP-FP group. Internists spent twice as much time per office visit, did 50% more tests per visit, spent more time with elderly patients and chronic illness, carried a heavier hospital case load, and delegated the same or more services to assistants except for telephone advice. Although Internists reported spending two-thirds of their time in their primary specialty (IM), over three-fourths of them reported spending an average of nearly one-third

of their time in a secondary specialty, and 13% of them spent 10% of their time in a tertiary specialty. That these activities constitute important aspects of the practice of Internal Medicine is evident by the reported one-third of hospital patients who were referred by other physicians.

Minimum office and hospital visit fees for Internists were 14% higher; and net income was 5% higher.

TABLE 7
Differences Between GP-FP & I.M. (Means)

	GP-FP	I.M.
Hours Worked/Year	2673	2568
Hours in Office/Week	34	38
Office Visits/Week	166	101
Minutes/Visit	13	26
No. Tests/Visit	0.9	1.4
% Medical Patients	51%	95%
% Chronic Illness	32%	46%
% Over Age 65	29%	38%
Hospital Case Load	10	18
% M.D. Referred	8%	33%
Out-of-Hosp. & Office Visits/Week	17	12
Delegation (% with some)		
Telephone Advice	63%	28%
Histories	43%	62%
Home Visits	19%	60%
Follow-up Visits	31%	63%

Pediatrics

Pediatricians made up 4.1% of all patient-care physicians and 3.8% of the study group. Profile analysis demonstrated the dominance of preventive care and episodic illness. Pediatricians reported the same large number of office visits per week as the GP-FP group, but more time was spent in well-person (36%) and acute episode care (43%) and less for hospital care (17%). Pediatricians employed the largest number of office assistants of any general specialty, but delegation of work was nearly the same as the GP-FP group. Although subspecialization was not as great as among Internists, nearly two-thirds of Pediatricians reported spending one-third of their time in a secondary specialty, and 8% reported spending another third of their time in a tertiary specialty.

Total hours of work and fee scales were comparable to Internists. Professional expenses were 9% higher than the average of all physicians, and net income was 8.5% lower.

Obstetrics-Gynecology

OB-G specialists constituted 5.6% of patient-care physicians and 4.3% of the study group. Emphasis on obstetrics was evident by the reported half of total working time spent on well-person

examinations and by the average of 157 deliveries per year. Thirty-five percent of the total number of reported deliveries were done by the OB-G group of physicians. In surgery, OB-G physicians reported over half as many total cases as General Surgeons (248 compared to 417). They reported the largest number of tests per office visit of any specialty (1.49). Total hours of work, fee scales, and professional expenses were similar to Internists and Pediatricians, but net income was higher than any other general specialty (\$46,821).

General Surgery

General Surgeons constituted 8.2% of all patient-care physicians and 6.9% of the study group. They worked more total hours per year than any other specialty group (9% above average) and spent over half of their time in hospital work. Fifty-nine percent of their patients were physician referred. They reported the smallest number of employed assistants and the lowest professional overhead of any general specialty. Routine visit fees were only slightly higher than the averages for all physicians, and reported net income was \$1200 less than that reported by OB-G physicians.

Other Specialties and Subspecialties

Twenty-two other specialties and subspecialties were included in the direct-patient-care classification. Collectively they constituted 38% of the total number of patient-care physicians and 44% of the study group. The relatively small number in each specialty made comparative analysis difficult. Overall averages of the profile data for these physicians were similar to the averages of all physicians except where the institutional base of many of them produced expected variations. Professional expenses were 18% less than the overall average, and net income was 18% higher.

Discussion

The research method followed in this investigation is basically a voluntary, subjective estimation of quantitative data by respondents to a mail-out questionnaire. Since there is no known method for validating the subjective responses, many persons, including some respondents in this study, have expressed considerable concern for inaccuracies in the method. However, where acquisition of objective data is not feasible, as in this study, subjective estimation by professionals is generally considered acceptable as an alternative

technique.

The results of this study correspond well, both grossly and relatively, with previous profile studies published by the AMA. Thus physician respondents throughout the country apparently respond similarly to this method of study.

Because of the unpredictability of response to mail-out questionnaires, the study-group used in this investigation was the entire population of direct-patient-care physicians. The 44% response was gratifying and is considered very significant, but the method does not permit any assumption that the characteristics of the non-respondent subgroup are the same as the respondent subgroup. In other words, the information obtained cannot be projected for the entire population of patient-care physicians.

The data presented offer potential assistance for tailoring educational programs to practice needs and for developing new incentive for correction of shortages. Many of the complexities of modern medical practice are evident; others can be readily inferred. Furthermore, the nature of future profile changes can be predicted if acceptance is given to the dictum that medicine is a service profession which responds to social demands for change. For example, delegation of professional services to assistants will undoubtedly increase fairly rapidly since it is already done to a significant degree.

This study focuses on quantities of services and therefore parallels the current social imperative to provide more services. Unfortunately, it was not feasible to investigate variations in complexity or quality of services. An office visit for a complex combination of diseases is very different from one for a common cold, but this study method could not reflect such differences.

This report constitutes a summary of the results

of the investigation. A comprehensive report is available for persons interested in more extensive data.

Summary

Broad profiles of medical practice were obtained from a mail-out questionnaire to all of the 3,383 direct-patient-care physicians in Minnesota. The 44% response demonstrated a high level of physician cooperation.

Compared with the data from national studies, Minnesota physicians averaged more hours of work, more patient visits, more office employees, higher overhead, and lower fees than the national averages. Net annual income was almost identical.

Delegation of office work was extensive for 16 different services. The Minnesota Relative Value Index was followed completely by 19% of responding physicians and used to some degree by 63%.

Physicians in partnership carried heavier practice loads than physicians in solo, group, or institutional practice. Minnesota data closely resembled national data.

The GP-FP specialty subgroup carried the largest quantitative load and provided the broadest range of most primary and many secondary medical services. It also had the highest expenses, but the lowest routine fees and the next to the lowest net income.

Profiles of the other general specialties demonstrated expected specialty characteristics and certain work advantages, but total work loads were similar to the GP-FP specialty.

Profiles of the 22 other specialties and subspecialties identified were not drawn because of the small number of physicians in each specialty and the extensive variation in work characteristics among individual physicians within each specialty.

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Physician's Assistants for Minnesota Family Practitioners

NEVA WIESEKE GONZALEZ, M.D., M.P.H.*

FOR YEARS PHYSICIANS who wished to divest themselves of routine diagnostic and therapeutic procedures have individually schooled office nurses and assistants in carrying out some of these duties. Recently, formalization of this educational process has begun with the advent of new programs to train various types of physician support personnel: Physician's Assistant (P.A.), Physician's Associate (not to be confused with University of Minnesota medical students on preceptorships), Medex, Nurse Practitioner, Nurse Clinician, Child Health Associate, Orthopedic Assistant, Ophthalmic Technician, etc. The National Academy of Science categorized non-nurse physician's assistants into three types:¹ Type A assistants have a broad knowledge of medicine with enough depth to integrate common findings and share in the decision-making process; Type B assistants have knowledge in greater depth but limited to a specialty; Type C assistants are able to assist generalists but function at a more technical and superficial level than Type A assistants.

Most physician's assistant programs are patterned after one of the two early prototypes: the Physician's Assistant (now called Physician's Associate) program at Duke University,² or the Medex Program at the University of Washington.³ Duke's program was the first of all of the P.A. programs, beginning in 1965. Usual qualifications of entering students include two years of college and one year of clinical experience. Although initial students were all former military corpsmen, other qualified applicants have since been accepted. The program consists of 24 continuous months of courses: nine months of preclinical courses and fifteen months of clinical rotations, chiefly in the hospital setting.

The first Medex program was begun at the University of Washington Medical School in 1969. Only former medical corpsmen are admitted. The program consists of three months of formal training plus a year-long preceptorship with a physician who is committed to hiring the student after completion of the course.

The Duke approach is patterned after the medical school curriculum: a broad science background and a rather comprehensive review of all disease conditions, common and otherwise. In contrast, the Medex approach is task-oriented and provides no basic science background.

The impetus for development of a Physician's Assistant Program at St. Cloud State College (S.C.S.C.) came from the Student Health Service which was almost constantly besieged with patients presenting the repetitious and routine types of medical problems which could have been aptly managed by a qualified P.A. Although the administrators and academicians at S.C.S.C. did not provide the original stimulus, they were quick to lend their support. The program would help to fulfill the commitment of the Minnesota State College System to new directions in higher education: provision of new career opportunities to meet genuine needs of society; response to the challenge of new cooperative endeavors with the surrounding community; and integration of previous clinical and life experiences of the student into academic programs.

Early interest in developing a P.A. Program at S.C.S.C. occurred almost simultaneously with a movement to establish an Area Health Education Center (AHEC) in St. Cloud as recommended by the Carnegie Commission on Higher Education.⁴ The reaction of those most committed to the AHEC idea was that a P.A. Program at S.C.S.C. would fit well with any AHEC which might be established. As concepts developed, two

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types of "AHEC's" came into existence: a Community-based Health Education Center (CHEC), funded by the Regional Medical Program,⁵ and a University-based AHEC, funded by the Bureau of Health Manpower Education of NIH. Fortunately, the two groups are cooperating extremely well, with the local consortium providing much input concerning the desires and needs of the fourteen-county central Minnesota area. This P.A. program provides a prototype for development of other health manpower education programs to respond to local needs.

Activities carried out as part of the P.A. Program development contract (April 1, 1972-March 31, 1973) were directed toward two main objectives: (1) documentation of the need for and feasibility of a P.A. Program at S.C.S.C., and (2) planning the educational program.

In order to document feasibility, five areas of concern were studied:

(a) *Local physician support. Since no medical school faculty is available, area physicians must be willing to teach P.A. students as well as hire the graduates.*

(b) *Acceptance of the P.A. Program by other health professionals. P.A.s must work with nurses and other allied health personnel as members of the health care team. Also a successful local P.A. Program should recruit some of its students from these groups.*

(c) *Need for the P.A. Physician's Assistants is not really needed unless a significant proportion of the primary care duties of physicians is presently devoted to the types of routine tasks which can be delegated to assistants.*

(d) *Medico-legal problems related to the employment of the P.A. in Minnesota.*

(e) *Financial support for the educational program.*

Planning for the P.A. educational program was divided into three components:

(a) *Curriculum content. Should the broad-based Duke or the task-oriented Medex approach be used? Or is there a middle ground?*

(b) *The length of the educational program and the degree(s) to be offered.*

(c) *Admission policies and procedures.*

Feasibility studies

Physician Support

To determine the extent of physician support

for the program, a questionnaire was distributed to the 255 physicians who reside in the fourteen-county central Minnesota area. Ninety-three (36%) responded. The age and specialty distribution of respondents is shown in Table 1. Opinions of Area Physicians regarding the P.A. showed good receptivity (Table 2).

TABLE 1
Characteristics of Physician Respondents

	St. Cloud MD's N=34 %	Other MD's N=59 %
Age		
25-34	18	19
35-44	38	25
45-54	32	24
55-64	0	8
over 65	0	10
No answer	12	14
Specialty		
Family Practice	9	73
Internal Medicine	18	2
Pediatrics	9	0
Other	64	15
No answer	0	10

TABLE 2
Opinions of Area Physicians

	St. Cloud MD's N=34 %	Other MD's N=59 %
1. General need for trained P.A.'s?		
Yes	71	68
No	12	7
Don't know	15	17
No Answer	0	7
2. Willingness to hire a P.A.?		
Very willing	29	24
Somewhat willing	23	27
Undecided	23	12
Somewhat unwilling	6	17
Very unwilling	9	15
No answer	9	5
3. Most important factor against hiring a P.A.?		
a. Lack of delegatory authority	41	36
b. Enjoy doing P.A. type tasks	6	2
c. P.A. couldn't do enough well enough	6	3
d. Already have assistants	12	19
e. P.A. would not pay his way	3	3
f. P.A. might take on too much	3	5
g. Other	0	3
4. Willing to serve as Preceptor for P.A.		
Yes	59	32
No	9	30
Don't know	32	32
No answer	0	5

Although physicians outside of St. Cloud were mostly Family Practitioners and were somewhat older, their attitudes toward the proposed P.A.

program differed only in less willingness to serve as preceptors. A majority of all physicians felt a need for the program and were willing to consider hiring a P.A. The legal problem of lack of delegatory authority was the principal deterrence.

Over 70% of St. Cloud physicians preferred a Duke type or a four-year degree P.A. program, but also wanted to allow office personnel to take classes without working for a degree or certificate (Table 3). Nearly half of them expressed willingness to teach classes, and nearly 60% were willing to serve as preceptors.

TABLE 3
Opinions and Support
by St. Cloud Physicians (N=34)

	% Response
1. Preferred Type Program at S.C.S.C.	
Medex type	6
Duke type	41
Four-year degree	29
Two-year certificate	3
None	6
Other	6
No answer	9
2. Should office personnel be allowed to take classes without being candidate for degree or certificate?	
Yes	79
No	12
Undecided	9
3. Should preponderance of classes be in evening to facilitate the above?	
Yes	38
No	12
Undecided	47
No answer	3
4. Would you be interested in teaching?	
Yes	47
No	26
Undecided	23
No answer	3

Attitudes of Other Health Professionals

Another questionnaire was distributed to staffs of St. Cloud Hospital, St. Cloud Veteran's Hospital, and doctors' offices in St. Cloud. Since administrators distributed the questionnaires to hospital employees, the number distributed is not known precisely but approximately 900. About 50% (465) were returned. Contrary to rejection of the physician's assistant concept by organized nursing, 90% of nurse respondents felt that the P.A. would fill a need in health care delivery; 16% (76) were interested in becoming P.A.s themselves; and 56% (261) were interested in taking courses on a part-time basis while maintaining their present jobs.

Potential Office Work for Physician's Assistants

In an effort to document the need for P.A.'s,

diagnosis and time studies were carried out in the S.C.S.C. Student Health Service and in the offices of four general practitioners in the central Minnesota area. In the physician offices a tabulation was kept of office patients for a five-day week. Table 4 lists the most common medical problems encountered in the Health Service and in the private offices. In each case, the problems listed account for over 70% of all problems in each setting.

TABLE 4
Common Medical Problems in Office Practice

	Student Health Service %	Physician Offices %
1. Respiratory illness	27	11
2. Musculoskeletal problems	13	10
3. Procedures such as PAP smears and wart removal	6	19
4. GYN problems	25	3
5. Routine physical exams	—	16
6. Prenatal care	—	8
7. Cardiovascular problems	—	8

The differences in the kinds of medical problems seen at the Health Service as compared to those seen in the offices of private practitioners can probably be accounted for by: (1) the limited age range of Health Service patients, and (2) the fact that the Health Service study was done in January during a flu epidemic while the other studies were carried out in June.

The average time spent with each patient at the Health Service (four and a half minutes) was somewhat less than in the private offices (six minutes), probably because of the more routine nature of the students' complaints and the fact that Health Service nurses were already performing some of the duties of the P.A.

The Problem of Legal Delegation

The survey of physicians showed that the major deterrence to the employment of Physician's Assistants is the lack of clarity regarding legal status (See Table 2). The Minnesota State Medical Association introduced a delegatory amendment to the Medical Practices Act in the legislature in 1969, but no legislation resulted. Prior to the 1971 session, the State Comprehensive Health Planning Agency convened a committee of representatives of various health professions to recommend health manpower legislation. However, no agreement could be reached, and the committee disbanded. The Comprehensive Health Planning Council subsequently developed two companion bills: one gave general delegatory authority to

physicians; the other formed a Health Manpower Coordinating Committee to advise the State Board of Medical Examiners regarding the need for certification and to authorize experimental programs for new allied health personnel. Pharmacy, Nursing, and Optometry strongly opposed the delegatory bill; the State Medical Association opposed the bill to form a Health Manpower Coordinating Committee. The bills never got out of committee.

The Education Subcommittee of the Minnesota House Appropriations Committee charged the Comprehensive Health Planning Agency with responsibility for developing a bill which would be acceptable to the various professional groups. With regard to the Physician's Assistant, the committee recommended legislation patterned after that enacted in North Carolina: delegatory authority for physicians and placement of responsibility for regulation of Physician's Assistants with the State Board of Medical Examiners. No P.A. legislation was passed in the 1973 session, but a bill was passed to empower the State Board of Health to develop credentialing for new health professionals.

Prior to the 1973 legislative session, the Minnesota State Medical Association took the position that no additional delegatory legislation was needed or desirable. It was not needed because: (1) physicians already enjoy a general power of delegation under common, or decisional law; and (2) Physician's Assistants who are presently employed in the state have been able to obtain malpractice insurance at reasonable rates. It was deemed undesirable because: restricting amendments might limit full utilization of Physician Assistants, and such specific legislation might cause legal problems in utilization of currently employed assistants who are not graduates of a formal P.A. school.

Financial Support

The problem of funding unexpectedly became the largest obstacle to implementation. The 19:1 student-faculty ratio upon which the Minnesota legislature bases allocations to State Colleges was obviously not realistic for a program such as this.

The University of Minnesota requested supplemental federal funding for the P.A. Program at S.C.S.C. as a part of its AHEC program. This was not granted because, as a federal AHEC contract official explained, federal funds were available specifically for Physician Assistant pro-

grams. Federal funds had been available but were committed to existing programs; none were available for programs which were to be implemented in 1973.

The chancellor of the State College System requested supplementary funding for the program from the 1973 Minnesota legislature. The request was not granted.

The Faculty Allocation Review Board at S.C.S.C. recently allocated enough faculty positions to implement the program without the extra legislative funding. However, St. Cloud State College has chosen not to implement the Physician's Assistant Program as such until College officials have had more opportunity to discuss the matter with legislative leaders who will be instrumental in providing adequate long-range funding for the program.

Planning for the P.A. Educational Program

A Physician's Assistant Program Advisory Committee was formed to assist in program planning and to help guide the new program proposal through the many committees which must grant approval prior to implementation at a State College. The Advisory Committee was composed of representatives of various departments of the college, a community physician, and the college's Allied Health Director.

After examining the curricula of many P.A. programs, it was decided to incorporate certain aspects of both the Duke and Medex programs into S.C.S.C.'s program: it would provide students with a broad science base but would conform to the realities of primary care practice in clinical instructional content. No specialty tracks would be offered and clinical experience would be gained chiefly through preceptorships rather than through extended hospital rotations. Preliminary curricula have been completed for all course work.

The survey of St. Cloud physicians (Table 3) indicated preference for a four-year program. The committee felt that students who successfully passed a four-year program of this nature deserved a B.S. degree and that such a degree would be indicative of their level of competence. The program itself would be only two academic years in length but would follow two years of appropriate general college study. Because it was felt that some individuals who have had considerable patient care experience may have gained the equivalent of two years of college through non-degree training, self-study, and experience, it was decided

to permit such students to enter the program. These students would be awarded an associate of science degree upon successful completion of the course.

The following criteria would be used for selection of students: clinical experience, education, area of residence, personal attributes, American College Test scores, and commitment on the part of a physician to employ the applicant following graduation. A set of application forms and selection procedures were developed. The California Personality Inventory would be administered to applicants who pass the initial screening, both as a selection procedure and as a start toward gathering data to determine personality traits which are most desirable in a P.A.

The Physician's Assistant Educational Program was reviewed and approved by the following committees: S.C.S.C. Liberal Arts and Sciences School Curriculum Committee, the S.C.S.C. Curriculum Council, the S.C.S.C. Faculty Senate, the State College Board Curriculum Advisory Committee, the State College Board, the Higher Education Coordinating Commission's Advisory Committee, and the Higher Education Coordinating Commission.

The American Medical Association would provide two kinds of credentialing for Physician Assistants: (1) accreditation of educational programs for the primary care P.A., and (2) uniform nationwide certification examinations for individ-

uals who are not graduates of approved programs as well as for those who are.

Summary

Studies carried out in development of a Physician's Assistant Educational Program indicate a high degree of acceptance of the P.A. by physicians and other health professionals in central Minnesota.

Studies in the offices of Family Practitioners and a Student Health Service demonstrated that certain medical problems are seen repeatedly and most of these could be managed by an assistant.

No delegatory amendment has been passed as yet by the Minnesota Legislature; this still discourages many Minnesota physicians from employing a P.A. despite the evidences of increasingly secure legal status.

The college's willingness to support the program has provided encouragement. However, if the program is to be launched and sustained, a broad base of legislative support will have to be established in order to assure adequate fundings over a period of years.

The program is geared to helping to meet health care needs in the geographic area served by S.C.S.C. It would provide a solid base of knowledge in the sciences. Instruction in the clinical areas would concentrate on diagnosis and treatment of conditions commonly seen by primary care physicians in Minnesota.

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Role and Preparation of the Adult/ Geriatric Nurse Associate

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IN AN ATTEMPT to satisfy the current increased demand for health care services, changing relationships between health care providers has been occurring. This has created a need for expanding and re-defining the roles of all health professionals. The change or metamorphosis of roles throughout the health care system has been of particular concern in the expanding role of the nurse. Development of the nurse to her fullest professional potential is seen as one way to increase effectiveness, efficiency, and quality of health care delivery.

Increased use of nurses in an expanded role began formally with the advent of the Pediatric Nurse Practitioner prepared initially at the University of Colorado.¹ Through such continuing education programs for nurses it is being demonstrated that physicians and nurses can establish a collaborative role relationship in the delivery of primary health care. The essential components to effect this role change are "lowering of attitudinal barriers, correction of educational deficiencies, and dealing with real and imaginary legal restriction of nursing practice."²

Many efforts have been made to promote expanded roles for nurses in adult and family health care. The Frontier Nursing Service was one of the first groups to report utilization of nurses in this manner. Other advocates of this role for nurses are Bates,³ Ford,¹ Kirk,⁴ Lysaught,⁵ and Scott.⁶ Many of their programs focused on spe-

cific clinical settings and were considered experimental, but several have evolved into continuous course offerings.

In support of the expanded role concept, the Department of Health, Education, and Welfare Secretary's Committee to Study Extended Roles for Nurses has developed and published a report detailing the extended scope of nursing.⁷ This was a first attempt at a formalized definition of the expanded nurse role.

The Adult and Geriatric Nurse Associate Program developed and piloted by the University of Minnesota, School of Public Health, Public Health Nursing Program, focuses on preparing nurses to function in an expanding role in the delivery of health care to the adult and geriatric population. In this expanding role the nurse assumes some clinical decision-making responsibility that has formerly been associated only with the physician. However, the new program maintains the professional nursing component—the teaching and counseling role, the family orientation to care, and a special concern with the psychosocial elements of health and disease.

The expanding role involves greater nursing responsibility along with significant primary care-taking responsibilities which are shared with the physician, including the physical and psychosocial health assessment. For the nurse this expanding role has aspects of what has been the traditional public health nursing role. The additional aspect is that the nurse is taught greater depth in physical assessment skills, thereby increasing the level of nursing responsibility and decision-making and increasing the degree and quality of nurse-doctor communication.

Objectives

In April, 1972, the Public Health Nursing faculty of the School of Public Health initiated the pilot project to develop and implement an educa-

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tional program to prepare Adult and Geriatric Nurse Associates. The overall purpose of the project was to expand the nursing role to provide increased preventive and health promotion services to the adult and geriatric population, with emphasis on service to rural areas where the need was greatest.

Specific objectives of the project were:

1. to develop and implement a curriculum to prepare nurse associates;
2. to offer this educational program at both urban and rural sites around the state, utilizing a traveling nurse faculty and local physicians;
3. to identify the dimensions of the nurse associate's role in delivering health care to the adult and geriatric population;
4. to develop a collaborative relationship with physicians in the delivery of care; and
5. to seek further economic support for program continuation based on evaluation of the pilot project.

Project Description

Several activities were carried out prior to the formal offering of the educational program. Interest in and potential utilization of the nurse practitioner were solicited from physicians, nurses, hospital administrators and consumers around the state through letters, personal interviews and public speaking engagements. Potential sites with student and physician commitment to the program were also sought during the summer of 1972. An Advisory Committee was formed with members representing nursing, medicine, public health, state legislature, senior citizen housing, hospital administration and nursing homes. This Committee served as an information channel to the professionals as well as to the consumer and provided direction for development of the educational program which would prepare nurses to meet identified needs in the community.

The educational program began on October 2, 1972. This continuing education, five-month, work-study program consisted of 110 hours of classroom instruction accompanied by 460 hours of clinical practice experience. Course content included interviewing techniques, medical history taking, physical examination skills, problem-oriented recording, pathophysiology review and problem identification based on the collected data. Also included was the nursing management of

acute minor illnesses and stabilized chronic illnesses. The major focus was placed on the recognition of the range of normal and on the identification of deviations from normal with translation of these findings into appropriate nursing action.

Classroom material was presented in a lecture-discussion format utilizing audio-visual aids as adjunct teaching tools. Video tapes were produced by the public health nursing faculty and physician specialists with the assistance of the audio-visual coordinator in the School of Public Health. In addition, physician, nurse and other health specialist lectures were audio-taped for classroom use. A few commercially prepared tapes and records were also employed.

Clinical practice experience was arranged and supervised by local physician-mentors. The clinical experience was obtained at the student's employment site. Additional clinical practice areas within the community were arranged for each student when necessary, to obtain a complete range of experience. Education at the employment site permitted involvement of the new role in the setting in which the student would be functioning as a Nurse Associate.

In an attempt to meet educational needs of professional nurses residing in rural areas, the program was designed to be offered at selected sites around the state. A traveling nurse faculty from the School of Public Health presented the didactic material at these employment sites on a bi-monthly schedule. Bringing the educational program out to the student in her community allowed more nurses around the state to participate in advanced educational pursuits and encouraged them to remain in practice in these rural sites. For the pilot project one rural and one urban site were selected. Three students were selected in the Thief River Falls area and six students in the St. Paul-Minneapolis area.

The nine students who participated in the pilot project were selected on the basis of maturity, problem solving ability, and evidence of independent decision-making in past work experience. These attributes were determined by use of a standardized psychological test (California Psychological Inventory) and personal interviews with the student and her employer. In addition, each student and her employer were asked to define a role within their health care agency for the student upon completion of the program. All employers

contracted with the School of Public Health to release the nurse-student from her job responsibilities for participation in the program.

A composite profile of the nurses enrolled in the pilot project was: married, female, 31 years of age, 1.5 children at home, a diploma preparation in nursing, and 8.7 years of previous work experience.

Current employment sites of the nursing students include a nursing home, hospital, public health nursing agency, group clinic, school of nursing, out-patient department of a county hospital, and solo physician's office. This variety of sites was deliberately sought by the faculty in order to assess the utilization of the nurse associate in a number of settings and positions, serving a consumer population with diverse characteristics.

Project Evaluation

Evaluation tools and methods for assessing the program objectives measured medical knowledge, task performance, and attitudes. An objective medical knowledge test was administered pre- and post-course. All students scored higher on the post-test than the pre-test, but the increase in score was not statistically significant. A pre- and post-task inventory analysis was also developed. The students rated the frequency with which they performed defined tasks, before and after the program. In addition, they were asked to indicate the ideal task performer from the health care team for each task. The performance of those tasks associated with history taking and physical examination increased in frequency, as expected. The performance frequency of tasks traditionally associated with nursing (i.e., patient teaching and counseling) remained constant, indicating that the nurses did not sacrifice the traditional components of nursing in order to add physical assessment skills. Rather, these skills have become an added dimension to their nursing role.

Student and physician-mentor evaluation of the entire project was elicited through written questionnaire and personal interviews. All regarded the course as informative and goal-oriented. The course length was generally considered satisfactory with appropriate allocation of time for classroom instruction and clinical practice experience. The program structure was considered very flexible in accommodating to student needs and abilities. Students felt they should be rotated through a variety of sites for clinical practice experience.

The physicians, however, favored student assignment to one site for the five-month period. Faculty analysis of student experiences demonstrated that clinical sites provided an appropriate case load for a variety of experiences in terms of patient age, presenting problem and diagnosed illnesses.

Students rated their own skills and knowledge in physical examination, history-taking, interviewing, management of minor illnesses and management of chronic problems. The majority of students felt they had a working knowledge and skill in all areas. Weakest areas identified by the students were the neurological and pelvic examinations.

Physician time spent with each nurse student varied during the course, with more hours of time initially and a gradual decrease in physician time as the student gained experience. Average weekly hours of physician time varied from three to 20 hours. Other variables were within the individuals themselves, nurse and physician, and their commitment to the project goals as well as their orientation to the educational process.

Consumer reaction to the nurse in this expanded role has been very favorable as assessed by both the physicians and students. Direct consumer reaction will be solicited by the project coordinators during this next year. Overall evaluation of the program was rated good with two physicians indicating "potential excellent."

Each student has begun to function as a nurse practitioner at her previous employment site. The different sites necessarily dictate differing utilization of the nurse based on that institution's needs. Defining the dimensions of the nurse practitioner's role in health care delivery has not been accomplished as yet. It is apparent that this role is still developing and more time is needed to allow for full and appropriate role experimentation. The public health nursing faculty will continue to monitor and record the nurse's utilization, her actions and performance, and both professional and consumer response to the nurse practitioner.

Because of the positive evaluations of the program and the increasing interest around the state from nurses and other health professionals, the School of Public Health sought state monies to offer the program on a continuing basis. An earmarked appropriation was awarded by the state legislature to fund this program for the next bi-

ennium. Plans include offering the program at other sites out-state where interest is keen, and doubling the number of programs offered by 1975.

Conclusion

The overall project goal of developing a course to prepare Adult and Geriatric Nurse Associates was realized. In addition, it was determined that such an educational program can be taught effectively away from the educational institution, thus allowing nurses in rural areas to participate. The impact of the Nurse Associate on the delivery of health care services to adult and geriatric patients is not measurable at this time, but isolated evidence has been accumulated indicating an increase in both quality and quantity of such care. Dimensions of the Nurse Associate's expanding role will be monitored over the next two years by documenting the activities and care delivered by the graduates of this pilot project.

Physician response to the program and to the Nurse Associate has been generally supportive and favorable.

Summary

The University of Minnesota, School of Public Health, Public Health Nursing Program developed a pilot educational program to prepare registered nurses to function as Adult and Geriatric Nurse Associates. The program was conducted at one rural and one urban site with nine nurses completing the course. The overall purpose of the program was to prepare nurses to function in an expanded role in delivering health care. Such role expansion for the nurse includes adding skills in data collection (history and physical examination) and problem identification thus permitting a higher level of decision-making in determining appropriate nursing intervention.

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Statewide Policies for Planning Nursing Education in Minnesota

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IN 1973, THE MINNESOTA Higher Education Coordinating Commission (HECC) expects to complete planning for nursing education in Minnesota. The program will produce planning guidelines rather than directives in order to preserve autonomy of institutions and faculty initiative. After acceptance by the Commission, planning guidelines become statewide policy and official direction for educators to use in planning future nursing education programs. Recommendations will guide the legislature in program deliberations and constitute specific criteria for review and evaluation of new and existing educational programs by the HECC.

Consistent with creating statewide coordination in the voluntary mode, development of guidelines by the HECC relies on two resources: data and expertise.

In order to provide data on supply vs manpower requirements relative to the state's capacities to respond, projections are analyzed in three related areas:

1. the annual potential student pool for programs (based on expected choices to enroll and probable completion rates);
2. the statewide "design capacity" or potential annual output from all nursing programs (assuming full utilization of existing and future resources committed to nursing education); and
3. the projected annual manpower requirements based either on economic demand or on qualitatively determined need for services (including an accounting of the extant manpower supply and expected program output).

Expertise is employed by identifying the "players," organizing them into groups and charging

the groups to make advisory decisions. These decisions become statewide policy after acceptance by the HECC. The groups combine educators or producers of educated manpower and employers or users of educated manpower on the theory that each type has something to tell the other in educational planning. Together they can assist in data analysis and determination of implications for planning policies. The "players" are professional or lay persons who can commit the constituencies which they represent. When they agree their constituencies can be presumed to concur.

Background

In 1965 the Minnesota legislature established the HECC to conduct continuing study and planning for educational opportunities consistent with statewide needs and rational use of resources.¹ In 1971, the legislature mandated the Commission specifically to review and make recommendations about plans, proposals and priorities for new and existing educational programs in public post-secondary institutions. In 1973 authority for inclusion of private educational institutions was added.²

In 1965 the Minnesota Board of Nursing conducted a series of meetings with nursing organizations and public agencies to plan for nursing education in a comprehensive and coordinated manner. After several months the Board concluded that this group was not sufficiently broad to ensure effective planning.

In 1966, a *Citizens' Committee for Nursing* was created under sponsorship of the Minnesota League for Nursing and the Minnesota Nurses Association. In May 1970 this committee made a number of recommendations based on the *Upper Midwest Nursing Study*,³ concerning: (1) the supply of nurses, (2) financial support for nursing education, (3) accreditation, (4) faculty, (5) career mobility, (6) continuing education, (7)

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nurse utilization and (8) community and regional nursing.⁴

Almost simultancously a *National Commission on Nursing and Nursing Education* published a series of recommendations on the future of nursing and added suggestions for implementation at the state level. A central recommendation in the summary report proposed that:

"Each state have, or create, a master planning committee that will take nursing education under its purview, such committees to include representatives of nursing, education, other health professions, and the public, to recommend specific guidelines, means for implementation, and deadlines to ensure that nursing education is positioned in the mainstream of American educational patterns."⁵

In response to that recommendation, representatives from the Minnesota Board of Nursing, Minnesota Nurses Association, Minnesota League for Nursing, Minnesota Licensed Practical Nurses Association and Northlands Regional Medical Program proposed that the HECC undertake a project to develop a statewide plan for nursing education.

The Nursing Education Project

The project goal was to design and test a statewide process which could produce and continually review a broadly acceptable and comprehensive plan for coordinated nursing education in Minnesota. The following specific objectives were included:

1. To prepare a data base for review and discussion of:
 - (a) the nursing student pool,
 - (b) the statewide design capacity in all levels of nursing education,
 - (c) the character, distribution and utilization of the nursing manpower pool, both present and projected;
2. To develop, through study and representative discussion, a comprehensive nursing education plan that will:
 - (a) determine the statewide need for nursing personnel of all kinds on a succession of target dates,
 - (b) take account of the need to implement previous state and national recommendations,
 - (c) plan an educational system that will provide needed personnel with specific recommendations to assure proper balance and distribution of nursing education programs,
 - (d) gear recommendations to produce prompt action and meaningful changes in nursing

education.

- (e) recommend sources of financial support for capital and operating expenses.
 - (f) maintain continued planning and evaluation of programs;
3. To design and appoint a broadly representative *Advisory Committee on Nursing Education* which will be engaged in the production of a comprehensive plan for recommendation to the HECC.
 4. To test this kind of planning process as a means of effective and acceptable planning for nursing education in Minnesota.

The membership of the *Advisory Committee on Nursing Education* was viewed as a key element of the project. Careful consideration was given both to the categories of membership and to the individuals appointed.

The 21 member *Advisory Committee on Nursing Education* provided representation from public and private institutions; from programs in universities, state colleges, junior colleges, area vocational-technical institutes, hospitals and private colleges; from programs for practical nursing, the three levels of registered nursing (Associate Degree, Diploma, Bachelor Degree), and graduate nursing; from users of nursepower including physicians and directors of nursing services; from the state student nurses association; and from all geographic areas of the state.

Eleven additional persons sat with the *Advisory Committee on Nursing Education* as consultants. They represented the State Board of Nursing, the Department of Public Welfare, the Department of Health, the State Comprehensive Health Planning Agency, the Minnesota League of Nursing, the Minnesota Nurses Association, the Minnesota Licensed Practical Nurses Association, the Minnesota Medical Association, the Minnesota Hospital Association, the Minnesota Association of Health Care Facilities, and the Northlands Regional Medical Program.

Regular members of the committee were responsible for evaluation of staff documents (research design, data analysis, etc.), review of the plan as it was developed and collaborative development of planning guidelines.

Special consultants provided liaison between the planning process and their respective agencies, and special technical assistance as needed.

The HECC staff was responsible for developing the research design; collection and analysis of data; acting as staff to the committee in clerical, professional and liaison functions; and producing the

final report.

The project was restricted to nursing and nursing education in Minnesota. It did not address the impact of policy decisions in Minnesota on non-resident students, the demand for Minnesota educated nurses in other states or the opportunity for Minnesotans to obtain nursing education in nearby boarder areas. While these were recognized as important issues, the limited available resources precluded consideration at this time.

In the absence of any agreed upon standards for defining "quality" or "need" for nursing care, or for behavioral parameters of nursing care, it seemed appropriate to limit the study to questions of supply and demand as economically determined.⁶

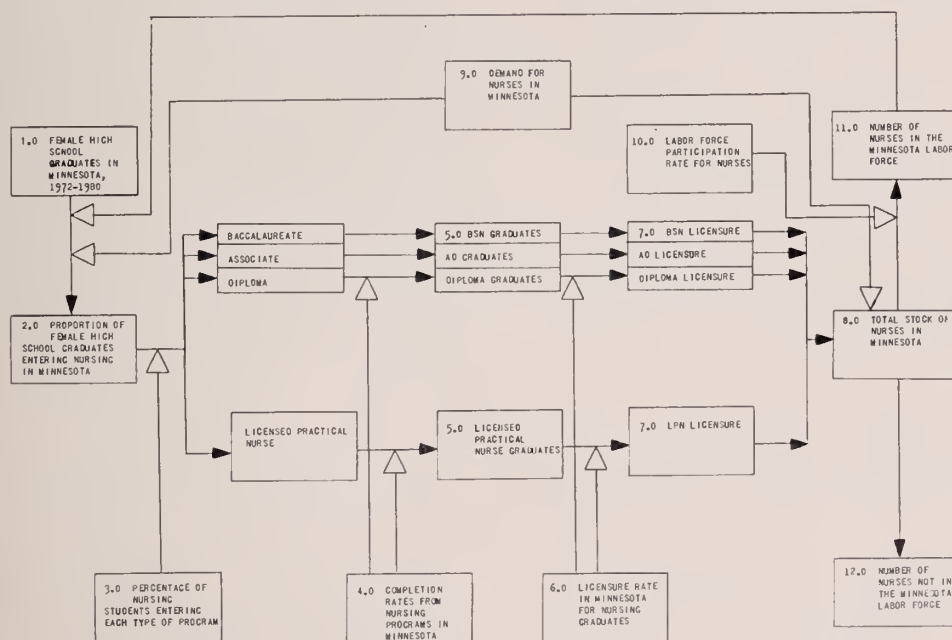
Methodology

The Figure graphically portrays the methodology for estimating the supply and demand for nurses in Minnesota.

Past experience was utilized to project developments to 1980. It was assumed that the output of nursing programs statewide is a function of economic demand for nurses,⁷ and that economic demand is determined by:

1. the demands for discretionary and non-discretionary care, and
2. the rise and fall in the supply of nurses.*

*Details concerning variables affecting nursing as an occupational choice are provided in Planning Report 12 of the Minnesota Higher Education Coordinating Commission (HECC).



Figure—Methodology for estimating the supply and demand of nurses in Minnesota.

In order to test this assumption, determinants were projected retrospectively to 1952 and annual estimates were compared with actual numbers of nurses for each year. There were no significant differences. With confidence, therefore, the same determinants were used to project the demand for nurses to 1980.

The demand also affects admissions and output of nursing education programs. In order to test this principle retrospectively the determinants were used to estimate the expected number of admissions, completions and licensures for each year since 1952. Estimates were then compared with actual through-put data available from the Board of Nursing. Again there were no significant differences. It was then possible to predict outputs of nursing programs to 1980 by use of projected population data from the Department of Health, and educational statistics from the Department of Education.⁸

Data from the Board of Nursing provided information needed to estimate the total nursepower pool in the state and the labor force participation rates. Finally, data were elicited on the number, location and capacity of all post-secondary nursing programs in Minnesota.

Findings

The *Advisory Committee on Nursing Education* accepted and discussed the following findings:

1. The demand for nurses in Minnesota between

1973 and 1980 is projected to increase by 19%, from 31,153 to 37,942. The increase will occur linearly and at the approximate annual rate of 2.5%.

2. The combined supply of RN's and LPN's is projected to increase by 24.6% if the low estimate occurs and 27.6% if the high estimate prevails, (38,675 and 39,789 respectively). In general, the percentage increase in the supply of RN's, LPN's and all nurses will decline slightly on an annual basis. The overall increase for RN's is 12.8% according to the low estimate and 15.3% under the high estimate. LPN's will experience a 51.6% total increase if the low estimate occurs and a 57.9% increase according to the high estimate.
3. The nursing manpower market is in an approximate state of equilibrium; that is, the supply and demand for nurses is relatively balanced.
4. The statewide demand for admission to LPN programs, should the low estimate occur, will not exceed the 1972 entry level admissions. If the high estimate is achieved, the 1972 entry level admission capacity will be exceeded by 2% to 5% by 1975. Beyond 1975 the high estimate will exceed the 1972 admission capacity by up to 12%.
5. The geographical distribution of LPN programs throughout the state has ensured reasonably good access for students in every planning region.
6. The statewide demand for admission to RN programs, as a category, will not exceed the 1972 entry level admission capacity. However, if hospital programs continue to phase out of operation, a shortage of entry level positions will occur before 1980.
7. Access to Bachelor Degree Nursing programs in Minnesota is restricted geographically.
8. The increasing demand for admission to Associate Degree Nursing programs will exceed the state entry level capacity by 1974.
9. Access to Associate Degree programs is restricted primarily to the metropolitan area.
10. If and when additional hospital Diploma programs in the Twin Cities are discontinued, the total number of entry level RN positions will fall below the 1972 level.

Policy Recommendations

The *Advisory Committee on Nursing Education* recommended several statewide policies for adoption by the HECC. In summary form they include:

- periodic reiteration of this planning process;
- involvement of statewide and regional health planning organizations;
- maintenance of the extant (1972) number of

entry-level positions in LPN and RN programs, subject to annual review;

- Commission encouragement of additions to the number of entry level positions as replacements when existing programs terminate;
- granting of preference to under-served regions of the state, either upon termination of existing programs or on absorption of surplus positions through increased student demand;
- involvement of the Board of Nursing in review of new programs insofar as curricula, faculty and clinical facilities are affected; and
- continuation of a statewide Advisory Committee on Nursing Education.

Next Steps

Once the recommendations have been adopted, they will serve as guidelines for institutional planners, the legislature, and the HECC in review of new and existing programs for nursing education.

The recommendations require certain actions for implementation: establishment and maintenance of working relations with the Board of Nursing and Comprehensive Health Planning Agencies; establishment of a continuing Advisory Committee; and periodic re-cycling of the planning process.

The *Advisory Committee on Nursing Education* recommended two additional studies. The purpose of one would be to determine behavioral differences between services performed by nurses educated in the several levels of nursing programs. The other would audit performance expectations among nurses trained at these levels. Objectives of these studies would include fixing criteria for arriving at acceptable service ratios between different levels of nursing education and planning for nursing education enrollments which are compatible with these ratios.

The committee also laid a foundation for addressing other pertinent issues such as career mobility, transfer of credits, continuing education, specialization, clinical station priorities, upgrading of programs, training of nurse-educators, interstate reciprocity, and improved communication.

Conclusion

The following basic objectives for nursing education were achieved: establishment and review of a data base; testing the acceptability and effectiveness of a planning process employing data and expertise; proving the effectiveness of a continuing *Advisory Committee on Nursing Education*; and developing a broadly acceptable, comprehen-

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sive, statewide plan for nursing education.

These achievements can become routine in the

statewide voluntary coordination of post-secondary education in nursing.

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Onward and Upward in Nursing

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DAG HAMMARSKJOLD SAID, "As a climber you will have a wide sphere of activity even after, if that should happen, you reach your goal. You can, for instance, try to prevent others from becoming better qualified than yourself."¹ This statement has relevance today for the person who wishes to change educational and/or career goals. Such a person often finds resistance among those who control the manner in which "career mobility" might become a reality.

In nursing the bachelor's degree is becoming the baseline preparation for employment in community health, clinical specialties and administrative roles and has always been the required stepping stone for graduate study. However, many nurses are not prepared at the baccalaureate level. The purpose of this paper is to report on the challenge examinations in nursing developed at the College of St. Catherine, St. Paul, Minnesota. Challenge examinations are a means to facilitate career mobility, in this instance for corpsmen, practical nurses, and registered nurses who are graduates of associate degree and hospital-based diploma programs, toward a bachelor of arts degree with a major in nursing.

Career mobility is a popular bandwagon to be traveling on these days, but more easily discussed than accomplished. The problems are multiple for the individual wishing to change career goals and work toward a bachelor's degree in nursing:

1. Few institutions are willing to give college

credit for experience or previous education not obtained in their institutions.

2. Given the large number of students interested in the nursing major, standards and qualifications for admission have become more demanding. Many more qualified students than can be admitted to the nursing major are already enrolled in the colleges and universities.
3. Priority is usually given to those students who are already full-time in the institution.
4. Few institutions see the necessity of trying to absorb into their programs students with different backgrounds, philosophies and knowledge.

The student has the following options open to her.[‡]

1. She may enter as a college freshman and compete with the rank and file for admission to the major.
2. She may enter a college or university which will provide a special program whereby all the courses in the nursing major may be completed in one year.[#]
3. She may enter a flexible program with an open curriculum, allowing for self-paced learning.
4. She may enter a program where college credit and advanced standing are given through challenge examinations.

Within educational institutions, challenge examinations have been utilized far longer for general education courses than for the courses in the professional majors. In part challenge examinations emerged from the frustration of educators who were confronted with students from divergent institutions of learning and backgrounds. In the case of nursing, in order to give credit where credit was due, several Eastern colleges and universities, during the early 1960's, began offering challenge examinations to determine a student's theoretical as well as practical knowledge in relation to the nursing courses offered by the particular institution. This differed from the former policy of giving blanket credit to all who completed a prescribed course of study. A limitation of the blanket credit system was the failure to allow credit for previous experiential learnings. Al-

This project was sponsored by the College of St. Catherine. It was a component of Northlands Regional Medical Program, Inc., supported by HEW grant #5 G03 RM-00021. Opinions presented do not constitute endorsement by NRMP, Inc., or the Department of Health, Education and Welfare.

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‡The female pronoun is used throughout this paper since most nurses are women.

#The University of Minnesota has a proposed program which would offer all of the nursing courses, including some challenge examinations to registered nurses allowing them to complete the requirements for a baccalaureate degree in two years or less. This proposal is awaiting legislative approval. A feasibility study was conducted under a grant from NRMP, Inc.

though challenge examinations may not provide a faculty with the same kind of information which would be collected over the period of time that a student was in the major, such examinations provide a means whereby a student may demonstrate the knowledge she possesses that is relevant to the major, whether she has gained her knowledge through formal education, incidental learnings and/or experience.

State college and university administrators in Minnesota, in response to their constituents, have encouraged their nursing departments to develop challenge examinations.² Private colleges also felt the need to respond to the requests of ever-increasing numbers of applicants wishing to enter the nursing major with advanced standing.

In the fall of 1970, faculty members in the nursing department at the College of St. Catherine began to consider the needs of the career mobilist. Thus began hours of discussion concerning the commitment of St. Catherine's to the student with advanced standing in the face of the already all-consuming efforts expended for the one with no previous nursing preparation. The faculty, hoping to cooperate with other interested nursing programs, initiated a statewide conference on career mobility for baccalaureate programs in nursing. This conference was subsequently sponsored by the Minnesota Board of Nursing and resulted in the formation of a Task Force on Career Mobility.

Administrators and faculty members at St. Catherine's supported the efforts of the nursing department to assist the career mobilist by permitting a departure in policy to allow eight courses* to be challenged rather than the usual two. For the past several years, the College Level Examination Program has been approved for students pursuing credit through examination for courses which fulfilled the general education requirements of the college and for some of the supporting courses for the nursing major. The hurdle still remained for the development of challenge examinations in the nursing major.

Project

Prior to receiving funds for the project, the faculty made decisions regarding the courses which could be challenged in the nursing major. The faculty decided that one course, "Theoretical Constructs in Nursing," could not be challenged

because of (1) the importance of the content to the practice of nursing, and (2) the length of time needed to integrate the philosophy of the course content and of the nursing program. For these same reasons, another decision was made that most courses could be challenged in their entirety, while in other courses, only a portion could be challenged.

The objectives of the project were threefold:

1. To construct challenge examinations in six of the seven nursing courses.
2. To develop a mechanism for making the test items available to other programs in nursing.
3. To communicate the results of the project to appropriate institutions and individuals.

Initially, members of the faculty met frequently to clarify their intents. From these discussions, a philosophy of career mobility was developed from which policy and procedure would follow.

Moving in, then, to the specifics of developing challenge examinations for which the college subsequently received funding, many questions arose. What is critical knowledge? What is mastery? How often will the examinations be given? How will they be graded? Several of these questions could be only partially answered initially. Discussion toward their resolution continued throughout the summer of 1972 when test items were developed, and into the current school year when the total nursing department faculty slowly continued to resolve the problems. Two areas needing further consideration are the delineation of mastery of content and the determination of critical knowledge.

Mastery refers to the acquisition of essential skills or knowledge at one's own pace regardless of the length of time it takes to "master" the content. A critical item is essential knowledge in the curriculum. A scheduled examination constitutes a time limit for acquisition of content knowledge. For example, a student may complete the mechanics of determining a patient's blood pressure correctly but fail to obtain an accurate reading. In mechanics she "passes," but because obtaining an accurate reading is a mastery skill, she may not progress in the course until she can perform the test repeatedly with accuracy.

As an example of a critical item, a student may take a practical test and pass all the items on physical skills, but may fail communication skill items in content on interpersonal relationships.

*There is a ten-course value to the seven nursing courses in the major.

Again on the average the student passes the test. However, her communication skills are still very poor. If this item is considered "critical," the student will not move into the next course; in fact this lack of knowledge may necessitate repetition of the course. Identification of "critical" skills is crucial since no further opportunity may present itself to evaluate these skills if the student successfully challenges subsequent nursing courses.

At St. Catherine's the testing of practical knowledge by simulation has been basic to the philosophy of the nursing department.³ However, the usual method involving time and effort by most of the nursing faculty had to be eliminated as impractical and too costly for challenge examinations.

During a ten-week summer period, the equivalent of five full-time faculty members worked on construction of test items. Following field trips, consultation, workshops and reading, a wide variety of audio and video tape items were developed to test the application of theory or practical skills. In addition to audio-visual methods, some simulated situations and a variety of paper and pencil items were developed to test other course content. These test items were reviewed by faculty members teaching in each of the courses in terms of basic construction of the item, content material being tested, and degree to which the item evaluated achievement of course objectives. Due to minor curriculum changes, oversights, and continuing evaluation of items by course instructors, additional items were added throughout the school year. All test items were filed on cards and categorized by course, content, and in some instances by course objective.

In order to establish validity and reliability, selected items were administered to junior and senior students currently enrolled in the nursing major at St. Catherine's. Item analysis was done by computer and each of the items was then re-evaluated.

Construction of challenge examinations also produced several indirect benefits:

1. Opportunity was provided to re-evaluate current course content, teaching and testing.
2. The faculty realized that the completed challenge examinations also benefitted all students in nursing.
3. The faculty became versed in necessary examination format for computerized grading and analysis.

The second and third objectives of the project required cooperation with other individuals and institutions. Two other projects, one sponsored by the University of Minnesota School of Nursing (funded by NRMP) and the other sponsored by the Minnesota Nurses Association (funded by the Division of Nursing, HEW), were closely coordinated with St. Catherine's. On several occasions all three project directors participated in programs at professional nurses' meetings to present the current efforts regarding career mobility in Minnesota.

In addition, all three project directors were actively involved on the Task Force for Career Mobility. This Task Force met repeatedly to categorize and classify the many test items. In addition to the items from St. Catherine's, contributions from five other baccalaureate programs became part of this test pool. All items were printed in book form, *Index of Test Items*, and copies were sent to the chairmen of the nine baccalaureate programs in Minnesota and to the National League for Nursing. The project directors also participated in planning and conducting career mobility workshops for faculty members from other nursing programs.

Discussion

The challenge examination project at St. Catherine's followed groundwork, planning and organization by the nursing faculty, several of whom were active in the Task Force for Career Mobility. The objectives and guidelines established by the Task Force were used as a basis for planning the project.

The project demonstrated that several courses in the nursing major could be organized into learning packets, thus providing flexibility and accelerated learning for career mobilists as well as generic students. In May and June of 1973, the nursing faculty developed complete learning packets for two nursing courses. Learning packets will present information in several modes, will arrange the information in order of priority of importance, and will contain pre- and post-tests to provide for self-evaluation. The use of video and audio tapes and other audio-visual materials as adjuncts will further enhance the use of learning packets.

Summary

Faculty in the Department of Nursing at the

ONWARD AND UPWARD IN NURSING

College of St. Catherine dealt with some of the problems faced by the career mobilist and developed challenge examinations to facilitate career mobility in a baccalaureate nursing program.

Through a variety of testing methods, the challenging student may receive college credit toward a baccalaureate degree in nursing.

A book, *Index of Test Items*, was prepared and

distributed to other schools and in the National League for Nursing.

Career mobility workshops for members of nursing faculties and presentations at state meetings disseminated the results of this project.

An apt motto for a faculty undertaking this process is, "Be favorable to bold beginnings."

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The Relationship between Kisch's Health Status Proxy and Three Direct Measurements of Health Status

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and JOHN F. ALEXANDER, PH.D.‡

THE PRIMARY PURPOSE of this study was to examine the interesting association between the disease conditions reported by a group of people and the health status of that same population. The stimulus for this work was provided early in 1971 when six small towns in Southwestern Minnesota formed a corporation to search for physicians and dentists who might be willing to come to their area. They submitted a grant request entitled "Joint Recruitment of Physicians" to the Northlands Regional Medical Program on August 1, 1971. At the same time, the Department of Family Practice and Community Health at the University of Minnesota initiated a survey of health care needs, wants and resources in the geographic area defined by the people of these six communities.

Despite its importance, health status is not generally well-defined. Even such universal things as cleanliness and healthy-appearing tissues have few scalar descriptions in the medical literature. Because of these problems, we chose only three well-standardized direct measures of health status; two dental and one quasi-medical: (1) The clean-

liness of the teeth, (2) The appearance of the gingival tissues, and (3) Physical fitness.

We also selected one indirect (i.e. proxy) measurement of health status¹ which has stimulated enough recent work^{2,3} to deserve the title well-standardized. These tools were used to investigate the relationship between health and disease which is the focus of our discussion.

Methods

The total population of household units in the six community area was identified through a cross-check of county directory, county atlas, telephone listings and school census. Each township was mapped and personal visits with knowledgeable individuals in each township were used to validate the household mappings. Random sampling within each age grouping was done using a random number table.

A stratified sample of 464 family units was chosen for the purpose of data collection. In August 1972, a team of interviewers explored health care needs, wants and resources as perceived by the person responsible for medical decisions within these households.[#] From this sample, a similarly stratified random subsample of 142 individuals, representative with respect to age, sex and number were chosen for the purpose of evaluating health status.

A general physical examination of each participant was carried out by one of the authors (JBO) with the assistance of two medical students.[§] Laboratory studies included electrocardiograms, blood chemistries and phytohemagglutinin determinations."

The total number of people completing the examination was 130. Three subjects were under five years of age. Their data was not included in the analysis.

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#The household survey was carried out under the guidance of Ms. Anne Marie Reynolds and will be reported in more detail in a subsequent publication.

§The authors wish to express their appreciation to Mathias Masem and Philip Hoversten, students at the University of Minnesota Medical School.

"Studies of blood chemistries were carried out by Ms. Lois Jenkins under the direction of Dr. Robert Bridges of the University of Minnesota, Department of Laboratory Medicine. They are part of a survey of normal laboratory values to be reported. Studies of phytohemagglutinins were carried out by Ms. Ruth Cadwell and will be reported.

HEALTH STATUS

The dental examinations were performed for 10 subjects only. The remaining 20 subjects were either edentulous or didn't show up for the dental examination.

The oral hygiene status was assessed utilizing Green and Vermillion's Simplified Debris Index (DI-S).⁴ Six teeth were examined and the scale ranges from zero to three.

Periodontal disease was evaluated by the methods of Ramfjord's Periodontal Disease Index (PDI).⁵ Measurements were made on all surfaces of the same six specified teeth and the most unfavorable score was assigned to the tooth. Gingival color was noted as well as periodontal destruction and a score was assigned with respect to the Ramfjord Index on a scale of zero to six.

The physical fitness of the participants was measured by the body's ability to take in and utilize oxygen (Pred-MVO₂).⁶ Subjects were required to pedal a bicycle ergometer against a series of carefully calibrated work load increments. Observation of the pulse rate response to the work loads was utilized to predict maximal oxygen consumption. Because of the age differences in heart rate related to oxygen consumption during work, age correction factors are built into the prediction equation. There are no established age correction factors for children under 15 years of age.

The Kisch Health Status Proxy (HSCORE) was self administered following the procedure as originally described by Kisch et al.¹ This probably resulted in lower mean scores as Carlton and Miller² found an increase in total scores when the conditions were read aloud by an interviewer.

The Kisch Health Status Proxy, first reported by Kisch and Associates in 1969,¹ consists of four questions: Question 1 covers days of hospitalization, Question 2, the history of the use of medicines, Question 3 consists of a checklist of acute conditions—those which existed for less than a year, and Question 4 is a checklist of chronic conditions. Each condition is assigned a numerical weighting and the higher scores represent a tabulation of more conditions of greater severity.

Results

It proved impossible to rank order physical examinations in regard to health status. It was our subjective impression that we were examining a generally healthy rural population.

Mean DI-S scores by age and sex are presented in Table 1.

TABLE 1
Debris Index Simplified (DI-S) Mean Scores
by Age and Sex

Age Group	Females		Males		Both Sexes	
	n	Mean DI-S	n	Mean DI-S	n	Mean DI-S
5-9	10	1.79	8	1.96	18	1.87
10-19	9	1.59	16	1.77	25	1.70
20-29	4	1.11	4	1.83	8	1.47
30-39	10	1.20	9	1.20	19	1.20
40-49	7	1.21	7	1.16	14	1.19
50-59	13	1.18	8	1.30	21	1.22
60+	3	1.43	2	2.50	5	1.86
Total	56	1.37	54	1.58	110	1.48

Generally, debris scores decreased as age increased. The mean score for the entire group was 1.48 and was significantly higher for male subjects 1.58 than for female subjects 1.37 ($p \leq .05$ rank sum one sided test). This tends to agree with other data in the literature.^{7,8}

Figure 1 is a graphic representation of Table 1 and depicts less debris on the teeth of girls

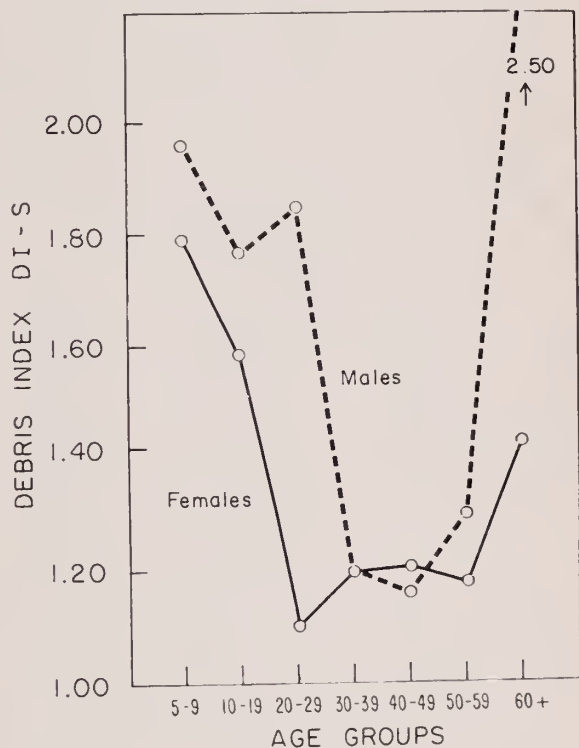


Figure 1

and young women. This is the finding usually reported in the dental literature. It may correlate with earlier female awareness of the value of oral hygiene in increasing attractiveness.

Table 2 shows P.D.I. mean scores by age and sex. In all surveys in which severity has been

taken into consideration, periodontal disease has been found to progress steadily with age.^{9,10,11} In this study the mean PDI scores increased markedly with age for both males and females.

TABLE 2
Periodontal Disease Index (PDI) Mean Scores
by Age and Sex

Age Group	Females		Males		Both Sexes	
	n	Mean PDI	n	Mean PDI	n	Mean PDI
5-9	10	1.13	8	1.23	18	1.18
10-19	9	1.99	16	1.78	25	1.85
20-29	4	3.42	4	2.50	8	2.96
30-39	10	3.15	9	3.69	19	3.41
40-49	7	3.80	7	3.76	14	3.78
50-59	13	3.81	8	4.28	21	3.99
60+	3	4.61	2	4.50	5	4.57
Total	56	2.94	54	2.80	110	2.87

In practically all surveys conducted in the U.S., the periodontal conditions are found to be significantly better in females than in males.^{12,13} In this study there was less periodontal disease in males than females in four of the seven age groups. Although the mean PDI score for females, 2.94, was slightly higher than for males, 2.80, the difference was not significant ($P > .05$ rank sum one sided test).

Table 3 shows the mean maximal oxygen con-

TABLE 3
Predicted Maximal Oxygen Consumption
(Pred.-MVO₂)

Age Group	Females		Males		Total	
	n	Mean Pred.-MVO ₂ cc/KG/mn	n	Mean Pred.-MVO ₂ cc/KG/mn	n	Mean Pred.-MVO ₂ cc/KG/mn
5-9	4	55.69	3	75.87	7	64.34
10-19	10	45.28	16	56.89	26	52.43
20-29	4	40.39	5	47.40	9	44.28
30-39	12	37.31	10	38.21	22	37.72
40-49	8	29.70	8	31.51	16	30.61
50-59	11	30.11	9	34.47	20	32.07
60+	0	0	2	21.82	2	21.82
Total	49	37.83	53	44.58	102	41.34

sumption by age and sex as predicted by pulse rate. The mean scores of oxygen consumption decreased markedly with age for both sexes, as expected. The mean oxygen consumption in ml/kg body weight for the group was 41.34. Results of oxygen consumption by age groupings in this study tend to agree with those reported in the medical literature.^{14,15,16}

Acute and chronic scores for the Kisch Health Status Proxy did not differ appreciably so only mean HSCORES are tabulated. Figure 2 shows that females have higher HSCORES than males in five of seven age groups.

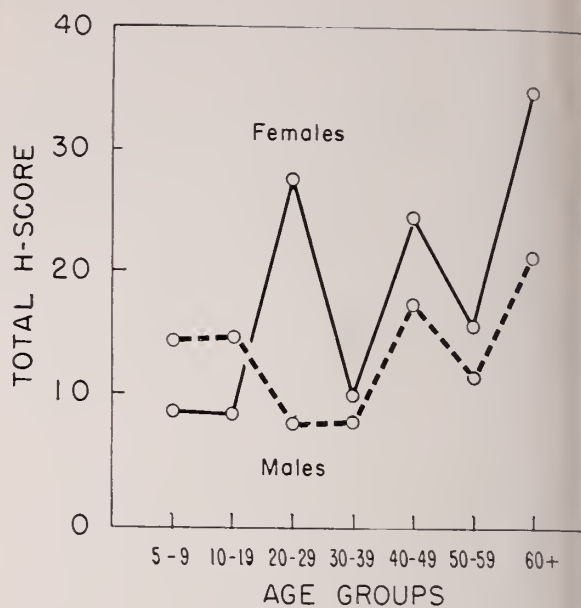


Figure 2

The mean HSCORES are presented in Table 4.

TABLE 4
Kisch Health Status Proxy
Mean Scores (HSCORE)
By Age and Sex

Age Group	Females		Males		Both Sexes	
	n	Mean H Score	n	Mean H-Score	n	Mean H-Score
5-9	12	9.75	9	15.22	21	12.10
10-19	11	9.45	16	15.50	27	13.04
20-29	4	28.50	5	8.60	9	17.44
30-39	13	10.92	11	9.00	24	10.04
40-49	8	25.63	8	18.63	16	22.13
50-59	14	16.36	10	12.30	24	14.67
60+	3	35.67	3	22.67	6	29.17
Total	65	15.66	62	13.98	127	14.84

HSCORES show no trend with age in males or females. The HSCORE for the entire group is 14.84. The females' mean score is higher than males, 15.66 compared to 13.98. This difference in mean scores is not significant ($P > .05$ rank sum one sided test).

An intercorrelation matrix for the five variables examined in the study is presented in Table 5.

TABLE 5
Rank Order Correlations Between the
Variables Examined

	Age	PDI	DI-S	Pred. MVO ₂
PDI	0.75†			
DI-S	-0.34	-0.19*		
Pred. MVO ₂	-0.66†	-0.44†	0.23	
HSCORE	0.18	.10	-0.05	-0.01

* $P < .05$

† $P \leq .01$

All of the correlations presented are calculated according to the Spearman's rank order correlation coefficient (Spearman's rho).¹⁷

Age was positively correlated with periodontal disease 0.75. This finding is consistent with previously reported studies. Age was negatively correlated with DI-S - 0.34 and predicted MVO₂ - 0.66. These three results are significant at the .01 level.

PDI scores were also negatively correlated with DI-S, -0.19 (significant at the .05 level). This finding should not be surprising because the amount of plaque present at one time is highly variable while periodontal destruction occurs over many years. Periodontal disease index was also negatively correlated with Pred. MVO₂ consumption 0.44 significant at the .01 level. This may suggest that the less physically fit subjects are also the subjects with the most periodontal disease, or conversely the physically fit subjects have less periodontal disease. All other correlations were not significant.

To further examine the relationship between physical fitness as measured by Pred. MVO₂ and periodontal disease, the sample was divided into four age groups and Spearman's rho was calculated for each group. The results are shown in Table 6. It is apparent that there is no correlation

TABLE 6
Rank Order Correlations between
Pred. MVO₂ and Periodontal Disease
within Age Groups

Age Group	n	RC	Level of Significance
5 ≤ 14	19	0.19	N.S.*
15 ≤ 30	21	0.01	N.S.*
31 ≤ 50	28	0.07	N.S.*
≥ 51	16	0.27	N.S.*

*N.S. = Not significant ($P > .05$)

between Pred. MVO₂ and PDI when subjects are classified by age.

The result of these studies (as summarized in Tables 5 and 6) shows that when the age is eliminated as a factor, there is no significant correlation between total health scores as measured by a standardized questionnaire HSCORE, and dental health as measured by oral hygiene (DI-S), the health of gingival tissues (PDI), and physical fitness as measured by the Astrand Bicycle Test.

Discussion

Definitions of disease and health are often ambiguous. For example, a widely accepted definition: "Health is a state of complete physical,

mental and social well-being and not merely the absence of disease and infirmity."¹⁸ This definition is typical of those found in medical literature¹⁹ in that it is vague. It is difficult to translate the subjective sense of well-being into an objective measurement.

Confusion arises when the words sickness, illness and disease are used in different ways. We will not debate the merits of any particular terminology but rather, will define the arguments more precisely, we have chosen Cassel's definition of disease.²⁰ To quote Cassel: "I shall use the word illness to mean what the patient has when he goes to the doctor's office and disease to mean what the patient has after leaving the doctor." In other words, we shall use disease to mean something which carries the physician's label; a name which can be accepted by both the physician and the patient. Figure 3 is a diagram of this definition. The ellipse represents those patients

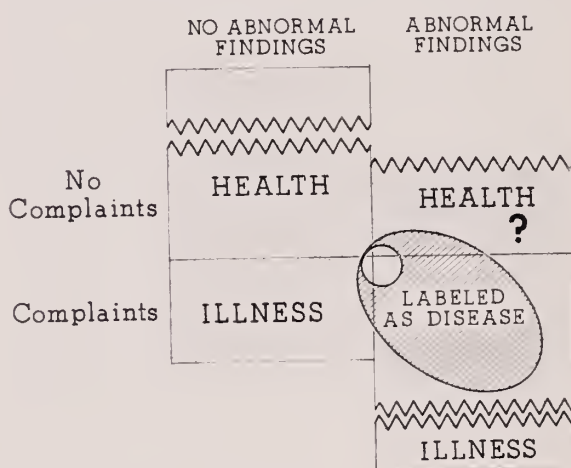


Figure 3

who have a disease; a condition with an acceptable name. The circle represents the margin of error. Those with complaints are, by definition, ill. Those patients with no complaints and no abnormal findings are healthy. The question mark is attached to those persons who have abnormal findings and no complaints. If they feel well are they healthy? Until the physician baptizes them with a disease label, they must remain in the large gray limbo of health.

Physicians take for granted that patients who have had various diseases are less healthy than other individuals. The concept that there must be a negative correlation between health and disease is a basic tenet of medicine. Despite this,

we are aware of the frequent counter examples; people who seemed frail and frequently ill and yet lived to an advanced age. These observations have given rise to many proverbs; for example, that the best way to live to a ripe old age is to get a chronic disease and learn how to take care of it, or that a squeaking gate hangs a long time.

The major lesson to be learned from the present study is that there was no significant correlation between the diseases reported by a group of people and three indices of health.

There are other recent studies which suggest that health and disease, as defined by the Kisch Health Status Proxy, do not consistently correlate. A study by Kisch and Kovner related HSCORE to the utilization of ambulatory services by subscribers to two different health insurance plans.³ The authors found that in 13 of 19 categories HSCORE did predict the level of utilization of health services, but that increasing intensity of illness did not correspond per se with increasing utilization of services.

Kessel and Shepherd²¹ studied the characteristics of people who were non-utilizers of ambulatory health services. They found that non-attendees had the same amount of recent trivial illness, but less emotional disturbance than recent attendees and that, in general, non-attendees took a favorable view of their own health status and considered themselves healthy.

Our failure to correlate disease conditions and health status measurements is not meant to suggest that no such correlation exists. The major

modifiers of health status, such as the automobile or subclinical arteriosclerosis, did not appear in the Kisch list of diseases. The present study serves as a reminder that too many of our tools are still primitive and measure the function of the organ rather than the man.

Summary

This is a report of the health status of a stratified random subsample (142 persons) of a rural population. It was done as part of a household survey of health care needs, wants and resources of an area including six small doctorless towns in which the people had formed a corporation to search for health care. Health status was measured directly by determining the extent of oral debris and periodontal disease. Bicycle ergometry was used to determine predicted maximal oxygen uptake as a measure of physical fitness. Rank order correlation of all variables considered in this population revealed no significant relationship between physiologic status, oral debris and periodontal disease when subjects were classified by age. There was also no significant correlation between these three direct health status measurements and a proxy measure of health status (Kisch et al.). The reasons for this apparent lack of correlation were discussed.

Acknowledgment

The authors wish to express appreciation to the people of Revere, Wanda, Wabasso, Lamberton, Jeffers, and Storden, Minnesota; to Dr. Wallace W. Nelson, the driving force behind the project; and to Dr. Winston R. Miller and Eugene V. Lenarz for their helpful reviews of this paper.

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Indian Health in Minnesota

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MINNESOTA INDIANS ARE increasing in numbers and they are moving from the reservations to the Twin Cities. In 1960 the U.S. Census counted 15,495 Indians in Minnesota, 21% of whom lived in the metropolitan area. In 1970 there were 23,128 Indians counted in Minnesota, 45% of whom were in the metropolitan area. It is estimated that in 1973 there are 17,170 Indians in the metropolitan area and of these people, 10,130 live in Minneapolis.

Settling in the city, Indian people have encountered difficulties in health, education, housing, income, employment, law and justice. Some Indians have solved these problems by adopting to varying degrees the life style and values of the white community. The majority of Indians who have migrated into Minneapolis and St. Paul have not been absorbed into the white culture. They have preferred to maintain Indian identity, values and life style. This preference has meant exclusion from successful participation in employment, health care, education, and other aspects of white society.

For the past four or five years Indians in Minneapolis and St. Paul have been working to establish their own organizations to deal with their problems. These include Indian schools, Indian alcoholism programs, rehabilitation programs for Indians released from prison, establishment of Indian foster homes for children and many other similar activities. Underlying these activities is the principle of Indian control and operation of efforts to solve Indian problems.

In the field of health, the Indian Health Board of Minneapolis was established in 1971 with a

grant from the federal government to document the health care problems of Minneapolis Indians and to formulate proposals for solving these problems. An additional grant was made by the Northlands Regional Medical Program to study Indian health care in the entire state. The following report on health levels and health care problems of Minnesota Indians is part of this activity.

The report includes: (1) conventional health level indicators such as infant mortality rates, comparisons of age-specific death rates and causes of death, (2) information on health care and socio-economic conditions collected through a survey of Indian families in Minneapolis, (3) information about Indians who visited the emergency room of Hennepin County General Hospital and (4) statements made by Minnesota health professionals about Indians and statements made by Minnesota Indians about health professionals.

The information shows that Indian people suffer from poorer health levels than do white people, that Indian people do not use health services effectively, that Indian people live under difficult socio-economic conditions and that there is poor relationship between health professionals and Indians.

Conventional Health Level Indicators

The infant death rate[#] among Indians in the metropolitan area is higher than that of the white community. The Indian infant death rate for Hennepin County was 35.3 infant deaths per 1000 live births per year for 1968-1970. At Hennepin County General Hospital from 1967 through 1970 there were 615 Indian births and 23 infant deaths. The rate was 37.4 deaths per 1000 live births. The infant death rate for all races in Minneapolis for 1968-1970 was 22.9 infant deaths per 1000 live births per year.

Indian infant death rates are higher in the metropolitan area than on the reservations. In 1968-1970 the Indian infant death rate per year in Hennepin County was 35.3 and in Ramsey Coun-

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[#]The Indian infant death rates used in this report are from a special matched study of birth and death certificates done by the Section of Health Statistics, Minnesota Department of Health.

ty 31.9. In contrast, the rates in two major reservation counties were 23.9 (Beltrami County) and 13.2 (Cass County).

Indian mothers do not receive prenatal care as early in pregnancy as do white mothers. Between 1967 and 1970 only 29.7% of Indian mothers in the metropolitan area began prenatal care during the first three months of pregnancy and 8.4% of Indian mothers received no prenatal care during their pregnancy. Among white mothers in Minnesota in 1969, 62.4% received prenatal care during the first three months of pregnancy and only 0.7% received no prenatal care during their pregnancy.

Indians die at earlier ages than do white people. In Minnesota in 1968-1969, 64% of Indian people who died were under age 65. In Minnesota in 1969 among all races, 31% of people who died were under age 65. The ratio of age-specific death rates for Indians compared with the age-specific death rates for whites in 1970 was as follows:

Age Group	Ratio of Indian/white
Under 5	1.66
5-9	0.42
10-14	1.58
15-19	3.32
20-24	5.31
25-29	3.88
30-34	4.67
35-39	4.02
40-44	4.18
45-49	3.49
50-54	2.58
55-59	1.69
60-64	1.44
65-69	1.05
70-74	1.20
75-79	0.74
80-84	0.78
85 and Over	.075

These ratios suggest that Indian people in contrast to white people are more likely to die between the ages of 10 and 74, particularly between the ages of 15 and 54.

Table 1 compares the major causes of death among Indians with those of all races. The data suggest that Indians are more likely than whites to die in young adulthood or middle age as a result of accidents. Indians tend not to live long enough to die of the diseases of aging (heart disease, cancer and cerebrovascular disease) which are the leading causes of death among whites. Indians tend to die during their productive years

whereas whites are more likely to remain alive until they have attained old age and retirement.

TABLE 1
Leading Causes of Death for Indians and for
All Races in Minnesota

Cause of Death	Indian 1968-1970 %	All Races 1970 %
Accidents	23.2	6.3
Heart Disease	19.7	37.6
Cancer	7.9	18.1
Cerebrovas. Dis.	7.1	12.7
Influenza and Pneum.	5.8	3.2
Cirrhosis	5.4	1.1
Early Infancy	5.2	2.2
Diabetes Mellitus	4.6	1.8
Other Causes	21.0	17.0
	99.9	100.0

Information Collected through Interviews with Indian Families in Minneapolis

Since August 1972 staff members of the Indian Health Board have been in the process of interviewing all households in Minneapolis in which Indian people are known to live. As of June 1973 more than 700 households have been identified. The following is an analysis of the first 389 households which were interviewed between August 1972 and January 1973.

Socio-Economic Conditions

Two hundred fourteen (55%) of the households were one-parent families; 635 children lived in these households. One hundred five (27%) of the households were two-parent families; 332 children lived in these households. Seventy (18%) of the households consisted of single male or female households.

Fifty (12.9%) of the households received their primary source of income from employment, 215 (55.3%) received their primary income from Aid to Families with Dependent Children (AFDC), 17 (4.3%) from Social Security and Old Age Assistance, 10 (2.6%) from other sources, and 97 (24.9%) reported no source of income. (Those households reporting no income probably survive through help from relatives and food shelves, and by work at day labor pools.)

Money for Health Care and Utilization of Health Services

Thirty-five (9%) of the households had health insurance, 229 (58.9%) were on Medicaid, six (1.5%) on Medicare, three (0.8%) had other sources and 116 (29.8%) had no source of money for medical care.

Although approximately 70% of households had a source which would pay medical bills, only

2% of the households went to private physicians and 8.2% went to private dentists. One hundred nine (28%) of the households identified a hospital emergency room as their source of medical care and used this source only on an emergency basis. One hundred fifty-one (38.8%) of the households did not identify any source of primary medical or dental care.

Presence of Health Problems

At the time the Indian Health Board staff visited the households, they found someone who required immediate inpatient hospitalization in 45 (11.6%) of the households. In these 45 cases the Indian Health Board made immediate arrangements and admitted 18 people to Hennepin County General Hospital, four people to other public hospitals, and 23 people to private hospitals. Table 2 lists the types of health problems interviewers found in the 389 households.

TABLE 2
Health Problems Found in Interview Survey of
389 Minneapolis Indian Households

Households*	Type of Problem
No. %	
131 34	Dental Problem
54 14	Eye or Vision Problem
22 6	Hearing Problem
94 24	Preventive or Diagnostic Concerns
25 6	Mental Health Problem
37 10	Alcohol or Drug Problem
44 11	Chronic Disease and Disability
84 21	Acute Medical Problems
3 10	Other Problems
44 11	No Medical or Dental Problem

*More than one problem was found in many households.

Information Collected from Emergency Room Visits at Hennepin County General Hospital

During the first nine weeks of 1972 information was collected on 512 Indians who came to the Hennepin County General Hospital emergency room. The median age of the individuals was 28. These 512 people made 682 visits to the emergency room—an average of 1.3 visits per person during the nine weeks. The average number of Indian visits per day was 10.8 with the greatest number of visits on Saturday and Sunday. In 14.5% of the visits there was a notation on the chart that consumption of alcohol by the patient was apparent. In 9.4% of the visits the patient registered and left without waiting to see the doctor. It was estimated that at least 67% of the visits were for minor problems that could have been cared for in a private doctor's office or in a primary health care center rather than in

a hospital emergency room.

Of the 512 individuals 192 were in for care, 150 on Medicaid, eight on Medicare, and 34 on other public payment sources, 17 on part pay, 95 on full pay, 26 with private health insurance, and eight with source of payment not stated.

Who Is To Blame?

The health level of Indians is not good and the relationship of Indians to the health care system is not good. Who is to blame? The health care system? The Indians? Poverty? Poor housing? Bad nutrition? Lack of information about health? Alcoholism? The conflict between two irreconcilable cultures?

Both health professionals and Indians have expressed some negative attitudes about one another. It is worth cataloging these because they clarify important feelings which are real and which must be dealt with as a part of improving the situation. The following are comments which the authors have collected from health professionals and Indians during the past three years.

Negative attitudes health professionals have expressed about Indians:

"The Indians have become too dependent upon the federal government . . . They ought to quit drinking and get jobs . . . They ought to get up in the morning and go to bed at night . . . They don't come in for treatment until they're dying . . . They come for treatment in the middle of the night for problems which are not real emergencies . . . They bring their children in too often for minor problems . . . They neglect their children . . . They overutilize free health care . . . They don't follow instructions . . . They don't keep appointments . . . They don't say anything . . . When you talk to them they won't respond . . . Our first job as health workers is to teach these people to keep appointments . . . Medical care for Indians is the wrong approach, it's a band-aid approach. What they really need is to get a job . . . These people expect good treatment but they don't want to pay for it . . . They spend their money on color television. They should learn to save . . . They refuse to discipline their kids . . ."

Negative attitudes Indians have expressed about health professionals:

"They really don't care about Indians. They're just curious about us . . . They use us for teaching and experimentation . . . They make you wait for hours and then they don't even examine you . . . He came in with a broken jaw, almost ready to pass out, and they started hassling him for money . . . The nurse never stopped talking so I could not say anything. She told me I was a poor com-

municator . . . I'll die before I go back there . . . We're scared to bring our kids to the hospital for treatment. The last time they called child protection and tried to take the kids away from us . . . Both insurance companies were liable but the hospital turned me over to the collection agency. Ruined my credit rating. In court I thought I was talking to the judge but it turned out the guy I was talking to was from the collection agency . . . The Intern examined her and told us we spoiled our kids too much. She died at home of pneumonia . . . They had to close the hospital up there. I think the doctor had a drinking problem . . ."

What Should Minnesota Physicians Do?

Physicians cannot solve all Indian health problems by providing medical care. Indian health problems involve more than medical care and involve other forces beyond the scope of the doctor-patient relationship. Nonetheless, good medical care is one essential component that Indians must obtain in order to solve their health problems. As a minimal goal, Minnesota physicians should address themselves to the task of providing quality medical care in a dignified manner to Indians.

The following are some suggestions to individual physicians and to organized medicine in Minnesota:

1. Quit thinking about Indians and other low income people in stereotype forms. It's mentally lazy and can lead to errors in medical practice. The stereotypes are false. There is a tremendous diversity of life style, personality and socio-economic level among Minnesota Indians.
2. Be satisfied with doing the best you can with a medical problem. You may feel that medical care is only a short-term, band-aide approach to over-whelming social and economic prob-

lems. Remember that the Minnesota Indian community is a growing and healthy culture, hard at work on its social and economic problems, solving them in its own ways. What the Indians need from physicians is medical care, not socio-economic advice.

3. Be aware of the strong influence of white cultural values on physicians. Career-oriented planning, respect for the basic sciences as the basis of medical practice, keeping appointments, good financial management—these are cultural values that white health professionals generally accept and live by. Indian people would not give these values the same priority rating, and indeed might rate these values low. The danger to Indian people is that if they do not accept white values, they will not receive high quality and dignified treatment. Be careful that you do not hold your values in such a sacred manner that you become prejudicial against people who reject these values.
4. Support useful improvements in the health care system. For example, there should be a way for Indians (and non-Indians) to leave the welfare system and become lower middle income working people without losing the benefits of Medicaid. With the high cost of health care and health insurance, the loss of Medicaid is an incentive for people to stay on welfare. If Indians leave welfare and enter a low income job in which they cannot afford health insurance, and then suffer an expensive illness, they are forced into bankruptcy and back onto welfare.
5. Keep an eye on new medical services being developed by Indians. They will need to employ physicians either part-time or full-time. One contact for such service is the Indian Health Board of Minneapolis, 1925 Nicollet Avenue, Minneapolis, Minnesota 55403. Phone 332-7301.

Rural Satellite Health Facility

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THE RURAL TOWN without a doctor is of national concern. The National Advisory Commission on Health Manpower, aware of this has recommended that "specially organized ambulatory care centers be established especially in geographic areas of need such as urban slums, revitalized urban neighborhoods, new towns, and isolated rural areas."¹ This indicates the emphasis that has been placed on the extension of health care services into geographically deprived areas.

A rural town which has no doctor and which seeks a new physician or a replacement for a retiring doctor may, by implication, be considered deprived. Many of these towns, however, are situated in areas where residents may reach a regional medical center in nearly as little time as required for city residents.² It is therefore important to determine what local needs remain, what medical services are required, and what arrangements should be made by a large medical center to meet the rural community needs and requirements.³ It is equally important to determine how well satisfied the residents are by this form of practice, which includes the services of a physician's assistant, as opposed to that of the local general practitioner whom they have come to know and have accepted so well in the past.

In an effort to deal with this problem, the Mayo Clinic, Rochester, Minnesota, established a satellite health facility in a small nearby rural community—Plainview, Minnesota. In order to examine the effectiveness of this model in meeting local health care needs, the utilization of the facility, the change in local patterns of medical care, the services provided, and the referral practices and community attitudes toward health care were evaluated. A study was made of those residents who attended the facility. A special household survey

of the community after the facility's first six months of operation was also undertaken in order to assess the demographic characteristics of the population itself, its present and prior sources of medical care including hospitalization, the overall use of physician services in the community, and the general attitudes toward health care. Information from the survey was obtained by personal interview of a random sample of 20% of the households in the community. The age and sex distribution of those surveyed was quite similar to distribution of the population in the village and rural community from which the sample was taken.

In addition, the services of a physician's assistant in supplying a proportion of primary care services were explored and a variety of medical services was provided. These will be reported on subsequently.

Background

Plainview, Minnesota, is a trading center for a farming area. In 1970 the village population was 2,093; the immediate rural area, defined by the Plainview postal area, included an additional population of 1,487. The village, which is located 24 miles northeast of Rochester and about 20

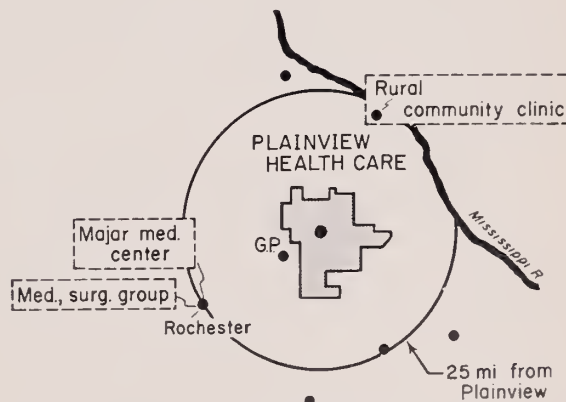


Fig. 1—Map of Plainview and environs. G.P. represents general practitioner's office.

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miles from small Mississippi River towns to the north and to the east of Plainview (Figure 1), has grown substantially during the last decade, partly by movement of retired farmers and their families to town and partly by the settling there of persons who commute to distant jobs.

In 1970, a delegation of civic leaders from Plainview petitioned the Mayo Clinic—the nearest large medical center—to find a replacement for its one doctor, who had discontinued his practice in town. Subsequently, a detailed plan designed jointly by groups from the medical center and local community representatives was developed for a one-year period of trial and demonstration.

Design of Health Facility

In the design of the demonstration facility, certain policies were established: (1) no restrictions were placed on age or place of residence; (2) a unit record system was maintained and records developed at the facility were incorporated in the files at the center; (3) patients with major trauma were referred directly to the emergency rooms at the affiliated Rochester hospitals; (4) any patient with a problem for which the facility was not equipped to handle and which was subacute was referred to a physician of the patient's choice, including the medical center; (5) fees were based upon customary levels of the medical center for similar services; and (6) extramural financial support was used for the evaluation only. The facility was open from 8:00 a.m. to 5:00 p.m., Monday through Friday. At other hours, during the evening and on weekends, the patients were advised to call the physician on duty.

Health Facility Personnel

The receptionist was responsible for obtaining demographic and clinical information on all patients seeking care at the facility and for recording data on prior sources of medical care and the reasons for seeking medical attention.

The physician's assistant—a graduate of Duke University Physician's Assistant Program with an additional two years' varied experience in the medical center—saw most of the patients. He took the medical history, proceeded with the physical examination, and managed the patient's problems according to the limitations defined by the physician. He quite frequently discussed the problem with the attending physician and was free to consult with any specialist at the medical center when he thought it necessary.

The physician attended the facility in the afternoons but was available to the physician's assistant in the morning by a direct telephone line between the health facility and the physician's office in the medical center. The physician followed the patients who had been seen initially by the physician's assistant as well as those patients whom he himself had seen first. Each physician from the group that planned the project attended the facility in turn, according to a monthly rotation schedule.

A pediatric nurse practitioner held a well-child clinic at the facility one morning each week. She had received intensive training from one of the medical center pediatricians and had two years' previous experience in this work.

Specialized diagnostic tests, when required, were performed at the medical center. Follow-up consultation was usually conducted at the health facility. Limited laboratory facilities, including those for routine blood counts, urinalysis, chest roentgenograms, and electrocardiograms, were available at the health facility in addition to those in laboratories at the medical center.

Findings of Study

Patient Characteristics and Utilization of Facility

One objective of the evaluation was to determine the characteristics of patients in terms of age, sex, education, residence, prior sources of care, and interval since the previous meeting between physician and patient. Utilization of the facility was also compared to that of other regional sources of medical care prior to or concurrent with the local opening of the facility.⁴

During the first year of study (September 1971 to the end of August 1972) the total number of registration visits for separate episodes of care (which may include several visits for the same problem) was 2,396; this total included 1,240 from the village, 484 from rural Plainview, and 672 from outside the Plainview area.

Individual patients coming to the health facility generally came from close environs (Figure 2). Of the individual patients seen in the facility ($N = 1,670$), 48% came from the village and an additional 21% lived in rural Plainview; the rest lived in nearby townships but only 4% of the patients lived more than 25 miles away.

Age Distribution

One of the distinctive features about patients

RURAL SATELLITE HEALTH FACILITY

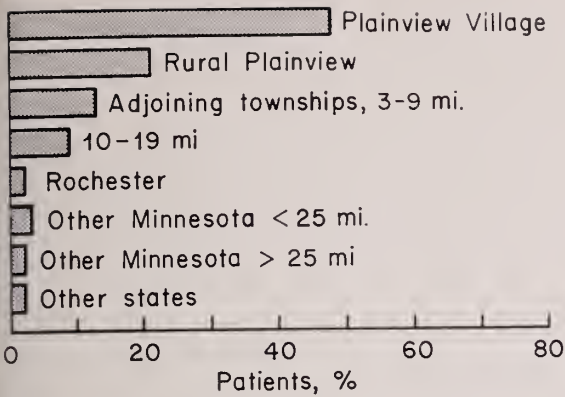


Fig. 2—Individual patients at health facility by place of residence (N = 1,670).

seen at the health facility was their distribution by age. The median age of the patients of Plainview village seen at the facility was 24, as compared to a median age of 33 years among the village population (according to 1970 US census); rural Plainview patients had a median age of 23, as compared to a median age of approximately 20 years for the general rural population.

Based on the proportion of patients' visits by age, it can be seen that younger patients from the village used the facility more frequently than would be expected from their numbers in the population (Figure 3). The frequency of expected age-specific visits to physicians was calculated on the basis of 1969 national health survey figures and the 1970 Plainview census.⁵ The expected proportion of physician-visits for patients age 24 or younger was 32%, as compared to the observed percentage of 52% among users of the facility. Whether this trend represents the special unfilled need of the young or the sign of conservatism of the elders in seeking newer opportunities for primary care remains uncertain.

Of the registrants at the facility, 57% were women compared to the 52% of women in the population (Figure 4). Furthermore, 45% of the

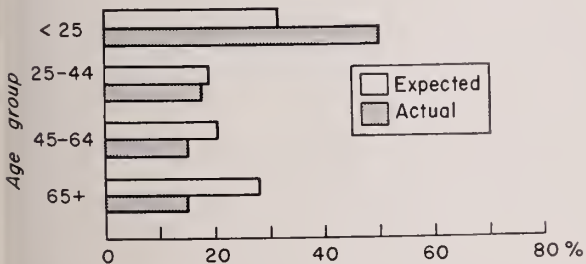


Fig. 3—Percentage ratios of observed to expected visits of patients to health facility among Plainview village residents, by age.

women seen at the facility were 25 years of age, as compared to 36% of women in this age group in the population. Among those seen at the health facility, 61% were under 25 years of age as compared to 42% of the population in the village population. The health facility was attended by young patients of both sexes, especially men. Among registrants older than 25, however, there were greater numbers of women in each age group.

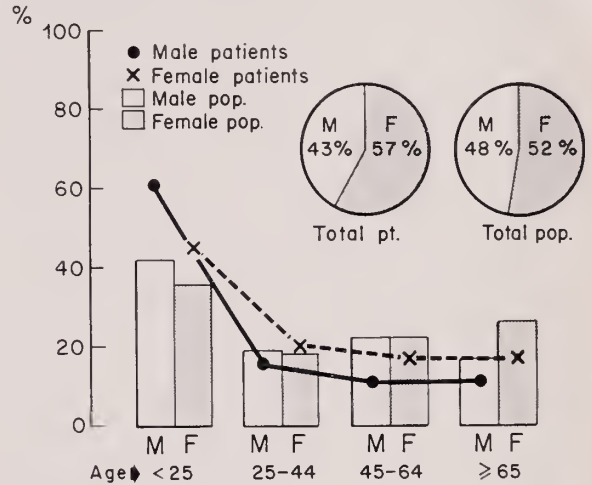


Fig. 4—Comparison of patient visits and population from Plainview village, by age and sex.

Educational Level

Another measure of the type of patient using the local health facility is obtained from classifications, by educational level, of the heads of households. According to a recent study, in the United States "race and educational levels are more strongly associated with utilization [of physician services] than is family income."⁶ In this regard, the educational levels, as indicated by the household survey in Plainview, corresponded almost identically to the 1970 US census for the village.

The educational level of the household-head was higher for those who used the facility than among those who did not (Figure 5). Among

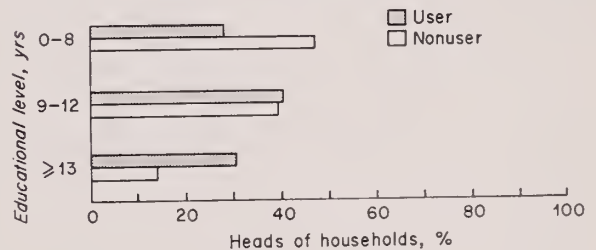


Fig. 5—Comparison of educational level (duration of education) of heads of households in Plainview village for users and non-users of health facility.

those who used the facility, the proportion of household-heads reporting 13 or more years' education was 31%, as compared to 14% not using the facility. This finding obtains even after the data are age-adjusted for differences among users and nonusers.

Level of income was not included in the survey.

Changes in Sources of Primary Medical Care

A series of comparisons was made to trace the pattern of medical care resulting from the introduction of this limited health facility in the community.

Records at the medical center of all patients from Plainview indicate that more than one-half of the population had received medical care at the medical center at least once during the prior six years. These records also verified that during the six months prior to the opening of the local facility, only 490 persons (14% of the total village and rural population) had received any medical service at the medical center. These rates showed that many persons used the medical center on a selective basis rather than for day-to-day care before the start of the local health facility.

By the end of the first six months of the facility's operation, 720 persons (20% of the Plainview village and rural population) had attended the local facility; only 224 persons (6% of the Plainview population) had come directly to the medical center without attending the local facility first. Although there was a decrease in the proportion of patients coming directly to the medical center for care (from 14% to 6%), there was an overall increase in the number of Plainview patients who sought care either at the local facility or the medical center (944 persons, or 26%). A large proportion of the services provided were preventive and reflected the type of primary care services delivered. A detailed analysis of the type and number of services and the contribution by the physician's assistant and the physician to the provision of those services is now being prepared.

In addition to the 224 persons coming directly to the medical center without attending the local facility, 148 patients were referred to specialists at the medical center, having first been seen at the Plainview facility; of these, 105 were Plainview village residents.

Analysis of Unmet Needs

Among health facility patients who were residents of Plainview village, 9% indicated that they

had previously been under the care of a doctor who was no longer present in the local Plainview community. This may be one indication of patients' needs and demands for the local facility.

Another measure of the amount of unmet demands was an analysis of the interval since the last physician-visit to village patients who used the facility initially. It was found that 40% of the village patients first seeking care at the facility had previously visited a physician within less than six months. While the National Health Survey data for 1969 may not be directly comparable, for populations outside SMSA the survey shows 53% seeing a physician within six months.⁷ Among Plainview patients the lowest physician attendance had been for those patients in age groups over 25 years. For example, only 30% of patients at the health facility between 25 and 44 years of age had seen the physician in the prior six months, and similarly 39% of patients between the ages of 45 and 64. Though perhaps not entirely comparable, the figures for these age groups from the national survey were 54% for ages 25 to 44 and 54% for ages 45 to 64 respectively. This suggests that adult patients first using the health facility may previously have had somewhat less care from physicians than might have been expected. After the initial six-month period of operation of the facility, the Plainview survey showed that 49% of the village population had reported seeing a physician within the previous six months.

Change in Community-Wide Pattern of Medical Care

An important consideration in assessing the patterns of medical care in the community is the change that occurred after the establishment of

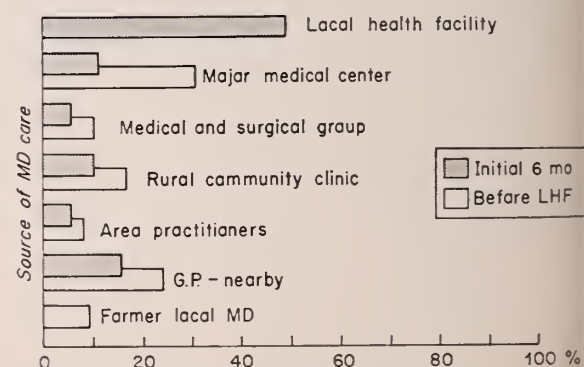


Fig. 6—Comparison of sources of physician care for Plainview village before and after institution of health facility.

the local facility.

For the period prior to the local facility, the pattern for use for each source of care (Figure 6) was reconstructed from the two sources of information on prior patterns of sources of care in the community. The first component is based on information from users regarding their prior sources of medical care, as stated on the first visit to the health facility. The second component is based on information from non-users obtained from the household survey. These two elements are combined to show the distribution of village residents by source of care before and after the establishment of the Plainview Health Facility.

Analysis of this summary shows that 49% of the patients chose the new Plainview Health Facility. This is the largest change in the overall pattern. The higher demand on the facility resulted in a lower demand upon other sources of care outside of town. While 31% of the village patients had previously gone to the major medical center, direct flow to this medical center declined to 12%. This proportion does not include the 48 patients seen initially at the local facility who were referred to the center for additional specialty services.

The study of initial change in patterns of care provides a basis for further assessment of the medical needs and medical services to a rural community as well as a base line for future trends in the source of care.

Discussion

This study reflects the experience of a large medical center in providing a limited facility for primary medical care to residents of a rural town without a doctor. The selection of the particular community of Plainview, MN, was related to the strong interest by leaders of the village in seeking local medical care and the medical center's determination to investigate its role in providing more basic medical needs to rural communities. The data obtained in the first year's experience of the health facility showed substantial support for the health facility by the residents of Plainview; while the facility offered a relatively limited number of medical services, this demonstration project did provide a measure of the perceived need above this specific threshold. The difficulty, as recognized by earlier researchers in the health care field, is that the "traditional method of projecting such issues—from present use patterns has the

serious drawback that if a service does not exist you cannot project it."⁸

The profile of patients who attended the facility was somewhat different from that of the population from which the patients came. For example, the users of the facility included a disproportionate number of children and young adults. This finding may be explained in part by convenience of the facility in terms of distance, time, and transportation required as well as by the reluctance of older people to change established patterns. Furthermore, the presence of a pediatric nurse-practitioner was in part responsible for the disproportionate number of children seen at the facility. One finding of special interest is that the patients coming to the health facility generally came from areas close by. Approximately one of every two residents of the community who were expected to seek medical care during the six-month period came to the facility, as compared to perhaps one of four residents of rural Plainview who sought such care during that period.

The heads of households of patients seen at the facility had a relatively high educational level. Since another study⁶ has also shown that educational level is more definitely associated with utilization of physician's services than is family income, this consideration may have special importance in the projection of future health care needs in rural areas.

For the most part, Plainview residents had not, however, been using the medical center for their day-to-day medical care. With the development of the health facility, an increased number of residents began to enter the larger medical system for routine primary care. As an example, one out of three health facility patients had no prior contact with the medical center system until their first visit to the local facility.

The rural community seemed to gain more convenient access to medical care at the center through this health facility, and it is possible that referral for secondary and tertiary care was more selective than had been the case previously. The need of some patients for medical care was more acute since their former doctor had departed from town; others had deferred seeing a doctor for an extended period of time. Children, young adults, and women especially showed a need for local medical care.

The community as well as the medical staff

benefited by gaining an experience with new health care techniques. Hopefully, this experience can

serve as a basis for the improvement of health care delivery in rural areas.

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Mobile Unit Health Care in Rural Minnesota

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PROFESSIONAL NURSES have unique skills and knowledge which, if properly applied, can be used to fill some of the currently unmet health care needs of our people. Using these skills, they have the capability of: conducting assessments of health, including the lack thereof; counseling persons with health problems; providing health education directed at preventing, or at least detecting early signs of illness; and following medical direction for administration of many types of treatment for illness. In essence, nurses have a major role if we are concerned about *health care*.

The purpose of this report is to describe the 12 months of operation of a Mobile Health Care Unit, staffed by registered nurses. Since the Polk County Mobile Health Care Project constituted a new demonstration program for improved rural health care, this report describes five chronological phases of this activity: (1) Planning and funding, (2) acquisition of equipment, (3) pre-operational development, (4) operation, and (5) evaluation and cost analysis.

Planning and Funding

Rural counties in Northwestern Minnesota have common problems related to health care: (1) they have higher than state average age groups of the very young and the elderly; (2) the location of medical care facilities is usually centered in the county seat, and public transportation is either non-existent, or very limited; (3) they have a number of villages and towns where no form of health care is available, e.g. Polk County has 18 such towns and villages; (4) most of the physician population is middle age or older and the area does not seem to attract young physicians; (5) residents report that they are re-

luctant to bother physicians about minor problems because "doctors are so busy" and (6) there is no reason to believe that conditions will improve in the near future.

Literature reviewed gives conflicting views on the value of mobile units. Many of the mobile units described were designed to screen only one or two facets of a person's health and therefore were not comparable to the present project. The findings of the Subcommittee on Health of the Elderly reported: "There is a great need for additional efforts to prevent chronic disease on a national scale. Multiphasic screening shows great promise as a practical method for early detection of chronic disease . . . and could result in considerable time saving for physicians—an important consideration in the face of a severe and growing medical manpower shortage."¹ A report prepared by Northlands Regional Medical Program stated, "Area A (N.W. Minnesota) data forecast serious problems for the health care system in the near future. The supply and demand principle has been increasingly ineffective in rural areas such as Planning Area A."²

For as long as the agency has been in existence, the Polk County Nursing Service has been involved in early detection and prevention of illness. The trend for many years was to focus on the school age child, and apparently efforts have been successful. Communicable disease for which immunization is available is rarely encountered; few new tuberculin reactors are detected in testing programs; and parents respond well to recommendations made by the Public Health Nurse regarding further vision, hearing, dental, or medical evaluation. Mass screening programs such as Vision and Hearing Clinics for pre-school children, and Coronary Screening Clinics for men are well attended. Polk County people, given the opportunity, are prevention and early detection oriented.

A dovetailing of the obvious need for improved health care with the skills and experience of the

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agency seemed appropriate. "Wouldn't it be possible to staff a Mobile Health Unit with registered nurses and send it out to doctorless towns and villages on a regular basis for the purpose of providing *health* care to all ages?" This question, accompanied by an outline of the types of services nurses could provide, was posed to members of the medical profession in Polk County. Two primary goals were achieved: approval by the medical profession to try to find funding for the project; and appointment of a Medical Advisory Committee to help develop and provide medical support for the program. Next, approval was requested and received from the Polk County Nursing Advisory Committee and from the Polk County Board of Commissioners.

Exploring sources for funding became a long and arduous task. Only negative response was forthcoming in spite of great time and effort expended in making numerous inquiries. A suggestion from a local physician that contact should be made with Northlands Regional Medical Program proved to be the "pay off." The interest of staff was not only a pleasant change, but it reinforced the belief that the concept had merit. With the help of Northlands staff and the Medical Advisory Committee, a grant application was submitted in December of 1970. A number of setbacks occurred during the quest for funding, but suffice it to say that funds were awarded late in 1971.

Acquisition of Equipment

Although a detailed budget had been prepared for the grant application, now that financing was available, line items on paper had to become real. Which motorhome within the price range would serve this purpose? Will it be possible to recruit capable nurses who are daring enough to break with the traditional role to staff this Pilot Project? Who offers the best price on equipment? Many decisions were required. With the help of the County Engineer, a 27-foot Travco Motorhome was chosen as the vehicle. Floor plans called for two offices separated by a reception area which included a bathroom and storage for office supplies. Interior fittings would, for the most part, be done locally since factory modification would be more expensive. After consultation with various experts, orders were placed for necessary equipment.

Pre-Operational Development

After the vehicle and equipment had been ordered, the next priority was recruitment of staff. Consideration was given to experience, attitudes, and ability to relate to and have empathy for people. Two local registered nurses who more than met expectations were added to agency staff on January 1, 1972. Both indicated plans to remain permanently in this community. This is very important since agency acceptance is increased greatly by low staff turnover. The nurses spent two and a half months in orientation, which included: becoming familiar with resources in the area; orientation to agency policies; learning screening procedures to be offered on the Unit; spending a training period first with an internist and then with a pediatrician to increase skills in health assessment; and assembling a library of educational materials.

Although communities had indicated a need for this type of service, and had been alerted to the fact that funding had been obtained, no actual involvement had been requested until this time. At this point, each community was asked to provide two contributions to the program: first, to choose a community liaison aide, and, second, to indicate where it would be best to park the Mobile Unit during visits. Whether the community aide would be a volunteer or a paid employee was the responsibility of the community. When a community aide roster had been compiled, Mobile Unit nurses visited each one to explain aide duties. These included making appointments for the next visit of the Mobile Unit, providing community liaison and obtaining transportation and other assistance for patients when needed.

Meetings were held with the Medical Advisory Committee to set up policies for operation. Types of services to be offered and standards for referral were determined. Copies of medical policies were sent to all practicing physicians in the county, and suggestions and recommendations were invited.

Finally, the public was oriented to the advent of this new health care facility. The mass media was utilized, brochures were distributed liberally throughout the county, and talks were presented to lay groups describing the objectives and services to be available. Orientation of the potential patient population emphasized that the Mobile Unit was in the business of *health* care, not *sick* care, and was staffed by nurses, not doctors. After the

vehicle was obtained, modified and equipped, the staff took the Unit to each scheduled stop so that residents could view it and learn what services it would offer.

Operation

On April 3, 1972, the Polk County Mobile Health Unit began formal operation with regularly scheduled visits every three weeks to 18 communities. The following health care services are provided:

A. Early detection through screening. Nursing assessment of personal health status using the following screening techniques:

1. Review of history form filled out by patient—this becomes part of a health status interview and includes a family profile.
2. Measurement of height, weight, blood pressure, intraocular pressure, and apical and radial pulses.
3. Vision screening (Titmus machine) and hearing screening (Vasque for preschool age, Maico Pureton for others).
4. Tuberculin test (when indicated).
5. Denver developmental test for children six years and under.
6. Demonstration of breast exam, with return demonstration by patient.
7. Observation.
8. Urine screening (Bililabstix).
9. Determination of hemoglobin.

B. Prevention:

1. Review of immunization status of all ages. Immunizations are given when indicated by medical policies.
2. Prevention through health education—examples:
 - a. Teaching patients with diagnosed conditions how to become involved in self care. Diabetics are taught importance of diet management, exercise, foot care, urine testing, etc. Cardiacs on medications such as anti-hypertensives and diuretics are taught the purpose of the medication, the importance of taking it as prescribed, and the potential side effects to be avoided. Multiple drugs are reviewed to prevent harmful interaction.
 - b. Teaching men, particularly those with family history of heart disease, about risk factors and how to reduce them.
 - c. Teaching women the importance of periodic Pap smears and pelvic exams for early detection of cancer.
 - d. Teaching mothers of young children safety measures related to poison prevention.
 - e. Referring socio-economic problems to proper resources, thereby reducing stress factors relating to health status.

- f. Teaching health hazards which were revealed by the family profile.
- g. Direct instruction of proper nutrition versus food and vitamin deficiency where no disease condition yet exists; supplemental teaching where a special diet has been prescribed.
- h. Teaching proper body mechanics and environmental safety factors for health maintenance and accident prevention.
- i. Mothers are encouraged to visit physicians for pediatric well child exams; and adults for regular medical check-ups.

C. Health counseling:

Nurses on the Mobile Unit provide a resource for the "worried well." Patients who have minor conditions which concern them, but which they feel are not serious enough to "bother the doctor" seek direction from the nurse. The nurse is instrumental in motivating the patient to seek medical care when it seems warranted. On the other hand, she provides reassurance when that is all that is needed.

D. Treatment or service by physician request:

Upon physician request, nurses give injections, change dressings, remove sutures, and collect blood and urine samples to bring to the lab. Hypertensives under medical treatment are referred to the Mobile Unit for follow-up between clinic visits. A mobile phone on the Unit facilitates immediate contact with the physician.

E. Public education:

Articles concerning family planning, immunization, glaucoma and hypertensive screening are prepared for the mass media, alerting the public to the value of prevention and early detection. The public is invited to the Unit for screening and counseling.

Evaluation and Cost Analysis

Despite the fact that the Mobile Unit is a new approach in health care for Polk County, public acceptance has been very good. From April, 1972 through March 31, 1973 the first year of operation—the results were:

Total patients visits	2438
No. self referred	2137
No. physician referred	99
No. return by Unit request	202
No. first visits to Unit	1805
No. later visits	633
No. given health screening	1803
No. positive findings	908
No. given health counseling	1468
No. immunizations given	1004
No. tuberculin tests given	884
No. Unit referred to M.D.	666
No. Unit referred to other resources	157

In rural areas, population is sparse and numbers

alone are not too meaningful. Percentage of population in a village who have visited the Unit gives a better picture of utilization. This varied from 15% to 76%, and averaged about 38%. Utilization was affected by factors such as: distance to nearest medical center, mobility of residents, and percentage of elderly in the community.

Although no study has been done on utilization by age, it appears that the major portion of patient clientele was among the very young and the elderly. Recently there seemed to be an increase in the middle age group.

Feedback from the communities has been excellent. Patients are pleased with the service and report their satisfaction not only to the agency but to County Commissioners and physicians.

The "Nursing Assessment of Health Status" component of mobile health unit services resulted in detection and referral of 330 medical problems during the four-month period of December, 1972 to March 31, 1973. Itemization of referrals of positive findings is as follows:

Elevated blood pressure	72
EENT problems	45
Vision deficiencies	26
Hearing deficiencies	30
Suspicious lesions	17
Dermatological problems	7
CV or peripheral vascular problems	10
Gastro-intestinal symptoms	11
Genito-urinary symptoms	21
Endocrine disorder symptoms	3
Diabetic symptoms	5
Low hemoglobin	6
Pap smears	16
Medical check-up needed	32
Miscellaneous conditions	29

No satisfactory method for feedback from physicians has been found, although several methods have been tried. Confirmation of findings and appropriate medical treatment came from the patients themselves—not an ideal method of evaluation. Physicians on the Medical Advisory Committee have been most supportive, perhaps because they are closest to the operation. Some initial resistance and questioning of the nurses' role was experienced. This seems to have been replaced with increased interest on the part of some physicians and token acceptance by others. The Polk County Nursing Service has worked well with physicians in the past, and there is no reason to doubt that this relationship will continue.

In the interest of conserving staff time and preventing disruption of school routine, the Mobile

Unit is being used to conduct Mantoux screening and Immunization Clinics at many schools. The Unit is driven up to the front door of the school, and the children visit the Unit for their "shots." The Unit has also been used to give tuberculin tests to Nursing Home staff thereby helping them to conform to regulations with the least effort and expense. Children in one Head Start program received their immunizations from Unit staff, and nursing assessments were given to children who had not had a medical check-up.

Since the Pilot Project was designed for a three-year period, evaluation of performance after only one year of operation is tentative at best. The project approach concerns itself with health care, not sick care, and the health system is presently not geared to pay for this service. There is no doubt of its value in the minds of those who are directly involved in the operation. Many other avenues of use are presently being explored: expansion of service into surrounding counties; use by the migrant population who spend eight summer weeks in the area; use by industries where presently no health exams are provided; preschool and camp assessments which tax the physician's already full schedule; and expansion to other Head Start programs and other schools.

Cost Analysis

It was originally intended that this three-year pilot demonstration project would be continued by fee-for-service and local subsidy if it proved to be successful. Cost analysis was conducted to provide an understanding of developmental costs and an appraisal of support needed for continuation.

The costs of planning the project, preparing and submitting applications for grant support and other activities connected with obtaining funding cannot be exactly documented. It is estimated that the Polk County Nursing Service expended about \$1000 in time, effort and office services for these purposes.

Acquisition of equipment and pre-operational development required seven months of time and effort. Total costs were as follows:

Personnel	\$ 5,915
Purchase & Equipment of Mobile Unit	21,345
Garage & Insurance	647
Travel, Phone and Maintenance	198
Office Overhead	701
TOTAL	\$28,806
Total Operational Costs for the first year of	

MOBILE UNIT HEALTH CARE

actual operation were as follows:

A. Fixed Costs	
Personnel	\$26,400
Equipment	
Garage & Ins.	780
Travel, Phone & Maintenance	2,184
Office Overhead	996
B. Variable Costs	
Supplies & Long-distance	
Phone Charges	1,800
TOTAL	\$32,160

The project grant from NRMP provided \$29,08, and total fees-for-service amounted to \$2,61. In the first year of operation patient visits to the Mobile Unit totaled 2438. The actual cost per visit was therefore \$13.19.

In projecting expected costs per visit after the pilot demonstration period is completed several additional factors must be taken into account: (1) vehicle depreciation and repair costs should be included; (2) variable costs will increase proportional to increase in the numbers of patient visits; (3) the average nurse time per visit will probably decrease; (4) a maximum number of patient visits will be reached.

If the life of the vehicle is estimated at 10 years, the depreciation allowance is \$2,135 per year. It was estimated that repairs will amount to \$5000 during the 10-year life expectancy (\$500 per year). The variable costs in the first year of operation amounted to 74¢ per visit. Nurse visits were of two types—health assessment requiring one hour per visit and brief episode requiring 15 minutes per visit. The proportion of all visits which were health assessment visits decreased from 90% in the first months to 60% in the last month. It can be estimated that the proportion will eventually stabilize at 50%. On this basis the average nurse time per visit would be 38 minutes. Experience during the first year has shown that the two nurses spend 200 hours per month in actual patient services. Thus the maximum potential for patient visits will be 3,789 visits per year. Estimated total costs per year based on the above principles are as follows:

A. Fixed Costs	
Personnel	\$26,400
Equipment	
Garage & Ins.	780
Travel, Phone & Maintenance	2,184
Depreciation	2,135
Mechanical Repairs	500
Office Overhead	996
B. Variable Costs	
Supplies & Long-distance	
Phone Charges	2,804
TOTAL	\$35,799

Based on these principles and calculations, the average cost per visit at maximum utilization will be \$9.45. If a 10% salary increase for personnel is added, the cost per visit would rise to \$10.14.

These costs per visit appear quite reasonable when compared to the average cost of \$13.53 per home nursing visit by the Polk County Nursing Service and the average charge of \$12.20 for a physician home visit in Minnesota.³ However, the method of payment for this kind of health care services has not yet been established. Part can be collected as a fee-for-service, but part will probably require subsidization from public or private sources.

Several factors provide additional justification for this service program including its cost per visit: if screening detects a condition before serious illness occurs, then money has been saved; if a disease has been prevented, then money has been saved; if the patient did not have to make a 100-mile round trip and lose several hours of work, then money has been saved; and if *health care* is considered important, then this money has been well spent.

Summary

A Mobile Health Care Unit, staffed by registered nurses, visits 18 doctorless towns and villages in Polk County on a regular basis. Its major thrusts are health maintenance, prevention of illness and early detection of disease using screening, counseling, and education techniques. Its major concern is *health* care, not *sick* care. Although it is still in the pilot phase, public acceptance has been excellent and physician acceptance adequate.

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A "Super-Nurse" for A Doctorless Town

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THIS PILOT PROJECT asked the question—can a small mining community in Northern Minnesota resolve many of its health care needs by having a competent nurse working in a clinic setting?

Many rural communities in Minnesota are without a resident physician and face the likelihood of never being able to obtain one. Tower-Soudan, and the surrounding area of the Vermillion Indian Reservation have a population of 1,400-1,500 persons with a tremendous influx of tourists during the summer season which almost triples this figure. This is a community without physicians and is 25-30 miles from medical care and hospitals.

Surrounding communities are well staffed with physicians who also serve residents in Tower and Soudan. Seven general practitioners serve the Ely area through two clinics and a 47 bed hospital. One general practitioner serves the Babbitt area. Two physicians had been in Cook working with a 23 bed hospital. Virginia (30 miles distant) has two large medical center-type clinics with many specialists and several independent practitioners. The Virginia Hospital has a 173 bed capacity.

Demographic data show a wide age span in the population of this area. Since the closing of the iron mines, many residents have remained and retired here, perhaps accounting for the 18 to 20% of the population who are over 65 (state average is 11%). Situated on the south shore of Lake Vermillion, the sixth largest of Minnesota's 10,000 lakes, Tower-Soudan attract many young and middle aged adults owning businesses

relating to sports and recreational activities (e.g., resorts, marinas, snowmobile and motorcycle shops, etc.) The children of this age group comprise the school age population of 29%.

Since other studies have shown that up to 70% of patient-physician visits do not really require diagnostic and management skills possessed by doctors, it was assumed that a clinically competent nurse could provide general health supervision, screening tests, emergency care for acutely ill and injured, health counselling, delegated medical management and referral to other health care facilities with continuity of patient care. A pilot plan was developed and money requested to demonstrate the feasibility of assigning a nurse to a "Doctorless Town" to provide primary health care services.

Included in this feasibility study which was funded from April 1, 1972 to April 30, 1973 were concomitant objectives which will at this point be viewed in the interrogative. Can this nurse providing health care services help the town to resolve its health care needs? How is the success, or unsucccess, of this program to be measured? How should the kinds of health care services needed by the residents be determined? Is one nurse able to provide them? Implicit were many other questions also, which would need to be answered as the project year began, continued and ultimately ended.

Two weeks prior to opening the clinic, leg work, telephone calls and meetings were held to establish: (1) a Medical Advisory Committee, (2) a Citizens Advisory Committee, (3) a site for the clinic facility, and (4) a meeting date to discuss health care needs with area inhabitants.

The Medical Advisory Committee was established through appointment of one physician from each clinic in the surrounding area. These doctors were responsible for approving standing medical orders and arranging for physician mentors to

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provide our nurse with additional technical skills, basic understanding and recognition of the normal to distinguish from abnormal. The doctors were enthused with the concepts and readily offered their services in training. The Citizens Advisory Committee was comprised of the entire city council of Tower (five persons) and three members of the Town Board of Breitung (Soudan).

Impediments But Not Barriers

When working with multiple communities, hospitals, physicians and clinics, it is of utmost importance to remain impartial and objective. It is painful to learn this the hard way—from the viewpoint of the project as well as the individual who experiences many sleepless nights. Covert competition readily comes to the foreground in daily meaningless oversights. *All* of the persons involved in even the slightest way must be included in planning meetings or injured pride results in diminished involvement or concern or general apathy, and the project suffers.

For a full three months, project people were involved with meetings with the Citizens' Advisory Committee, physicians individually and in groups, and nurse applicants. Applications came from several states, but the majority were from Minnesota. Nursing background was varied: Masters degree nurses interested in "developing the expanding nursing role," Army corpsmen with an Associate Nurse degree, and diploma R.N.'s. All wished to become nurse practitioners in a clinic setting.

Super-Nurse and Storefront Clinic

After many interviews by the Project Director and the Citizens Advisory Committee, Mrs. Edith Trembath, R.N., a life-long Tower resident, was employed as the clinic nurse. Edith is a diploma R.N. and the mother of seven children with 14 years experience as staff second head nurse at the Virginia Municipal Hospital.

Following employment, even though still on her own time," Mrs. Trembath wished to be included in all "equipment roundups." Her suggestions were invaluable as to types of items which would be necessary or useful. The chairman of the Citizens Advisory Committee arranged for pick up of equipment and supplies, "pre-requisitioned" from scavenged items from surrounding hospitals, clinics, and the County Health Department.

The Citizens Advisory Committee made ar-

rangements for renting and redecorating a former card and gift shop for the clinic. A subcommittee of Economic Opportunity group subdivided the space and completed redecorating. The Committee and OEO group arranged for the \$75 per month rent and hired a clerk for the clinic.

For the first six weeks of her employment, Mrs. Trembath was oriented to the new position with help from physician mentors of the Medical Advisory Committee and nearby clinics. At the end of six weeks she was feeling comfortable in performing a systematic nursing assessment and complete patient history. Other acquired skills included vision and hearing screening, otoscopy, ophthalmoscopy, tonometry, airway insertion, cardiopulmonary resuscitation, auscultation, palpation and percussion. Physician mentorship sessions were continued twice weekly for several weeks after the clinic opened. Other inservice education oriented the nurse to other community resources: Family Planning, Crippled Children Services, Mental Health Center services, Genetic Counselling, etc.

The caption "Supernurse to Fill Tower-Soudan Area's Need for Medical Service" appeared in a front page newspaper article in the July 26th Duluth Tribune as a result of Edith's explanations at a St. Louis County Board of Health meeting. This epithet "Super-nurse" is one that Edith is, teasingly, not allowed to forget.

New Concept in Health Care in Minnesota

An "Open House" of the clinic facility and the independent nurse practicing as primary deliverer of health care services was attended by over 100 persons. No patients were yet being seen, but it was desired to have the people in the community visit "their" new facility and learn of the services to be offered.

Clinic hours were set at 9-12 and 1-3. From the first day 10 to 15 patients were seen daily at the clinic; home visits were made on request; and referral to the public health nursing service was made for ongoing home services and intensive counselling. Telephone communication between the clinic nurse and area physicians was constant and ongoing.

In the first six months "Super-nurse" saw 534 separate persons for a total of 1,415 visits. The majority of problems requiring attention were

blood pressure checks for patients on prescribed medication or suspected hypertension, prescribed allergy injections, eye complaints, rashes, sore throats, and prescribed immunizations. By this time the needs of the community and the expectations of the physicians were clearly evident. Both groups were obviously satisfied.

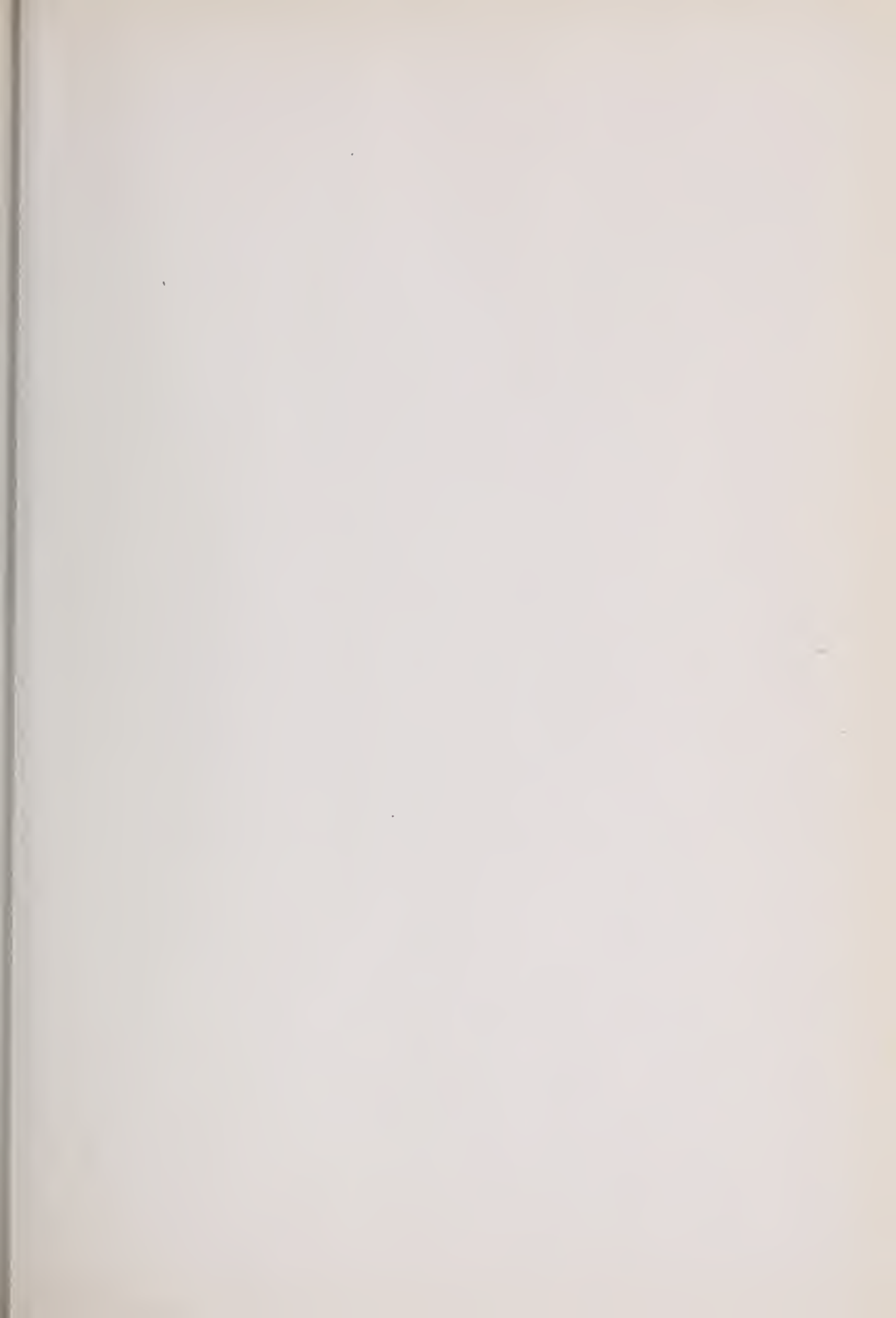
By the seventh month it was obvious that plans must be developed for continued funding after expiration of the one-year grant. Meetings with the project director, Citizens Advisory Board, business administrators of physician clinics and representatives from the Northlands Regional Medical Program were held to discuss appropriate fee schedules. A proposed expenditure budget of \$1,550 per month was developed. Several fee schedules were suggested: (1) initial visits \$7.50, including history and nursing assessment, follow up visit \$5, minimum visit \$3; (2) initial visit \$4, subsequent \$2; (3) initial \$4, subsequent \$3.

The project director felt that if the first fee schedule was adopted, Tower and Soudan payed the rent, and OEO paid the clerk, the funds would be sufficient to sustain the clinic. Plans 2 and 3 would need subsidies because of the low fees. Not wishing to "frighten away" patients, the Citizens

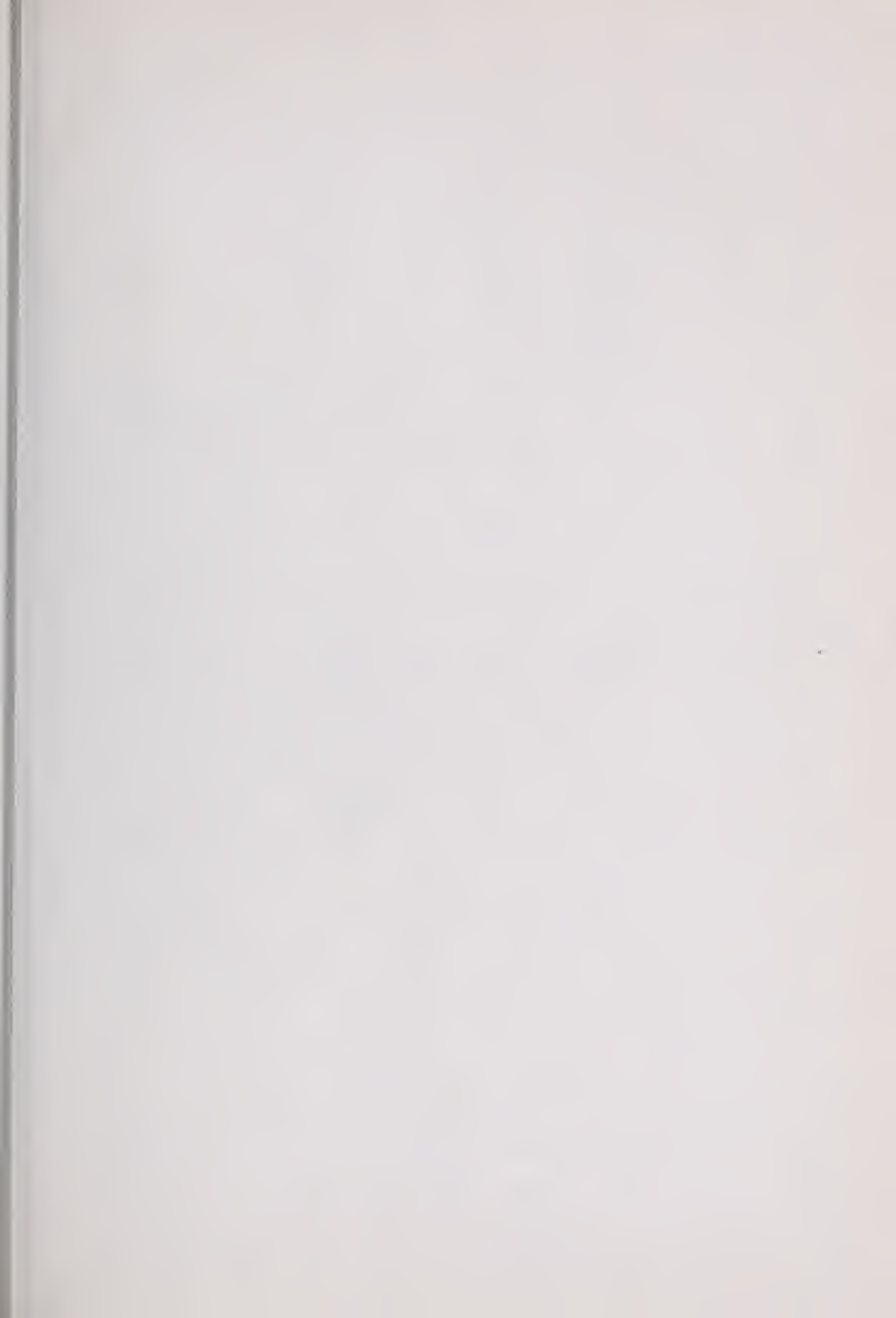
Advisory Committee favored low fees with financial subsidies for the remainder.

Since evaluation of resident response was needed for determining effectiveness of the project, an article was placed in the local paper soliciting comments, both pro and con, and suggestions for future fee schedules. Letters poured in for continuation of the clinic. Seventy-one individuals and six local clubs or groups responded favorably. Many indicated willingness to pay fees up to those charged by their private physicians because of convenience, mileage saved, and confidence in the competence of the nurse.

As of this writing, the City of Tower is planning to investigate legal aspects more completely but will definitely continue the clinic and have Edith as their employee. A fee system has been approved: \$3.50 per month per family, \$2 per couple over 65, and \$2 per individual office visit—*Much too low for economic stability!* The townspeople plan to seek other sources of subsidy for the balance of needed funds. They're a spunky lot who will undoubtedly find a solution to future funding, because the residents of a doctorless town have found out what in health is good for them.







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